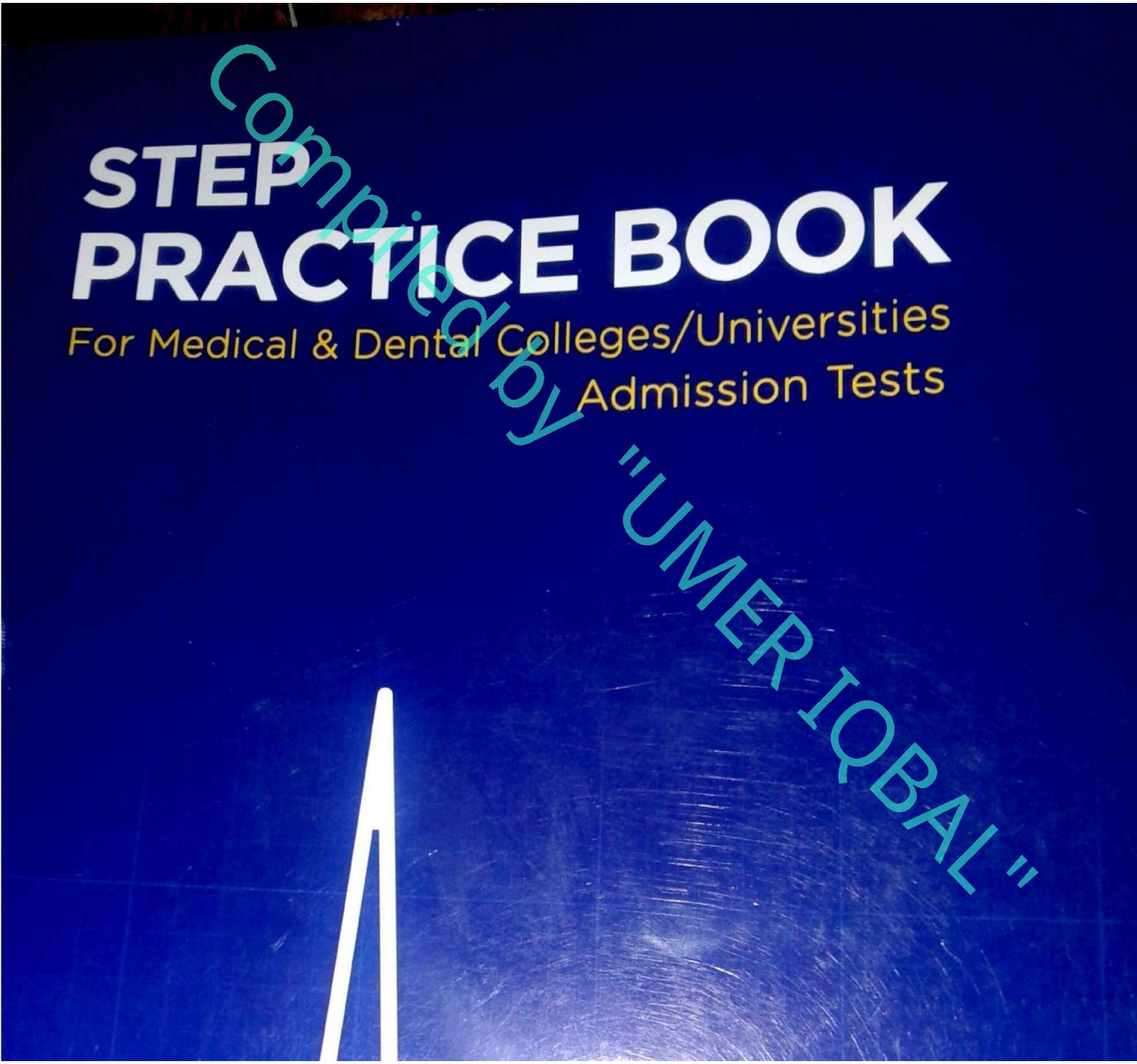

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A lot of prayers needed :)

PHYSICS

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Worksheet-1

Topic:- Physical Quantities, Units, Errors, Uncertainties & Prefixes

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Q.1 Supplementary units are:

A) Two
B) Three
C) Four
D) Five

Q.2 A set of supplementary units are:

A) radian, kg
B) radian, mole
C) radian, steradian
D) time and meter

Q.3 Example of Base quantity is:

A) Area
B) Light year
C) Velocity
D) Volume

Q.4 S.I unit of plane angle is:

A) steradian
B) radian
C) candela
D) None of these

Q.5 One light year is equal to:

A) 9.46×10^{15}cm
B) 9.46×10^{15}m
C) 9.46×10^{15}km
D) 9.46×10^{15} mile

Q.6 For a diffraction grating $d = \frac{1}{N}$ and for a solenoid $n = \frac{N}{L}$. What will be the units of "N" in $d = \frac{1}{N}$ and "N" in $n = \frac{N}{L}$ respectively?

A) $kg^0\ m^0\ s^0, kg^0\ m^0\ s^0$
B) $kg^0\ m^1\ s^0, kg^0\ m^{-1}\ s^0$
C) $kg^0\ m^{-1}\ s^0, kg^0\ m^0\ s^0$
D) $kg^0\ m^{-1}\ s^0, kg^0\ m^1\ s^0$

Q.7 S.I unit of amount of substance is:

A) ampere
B) candela
C) mole
D) joule

Q.8 The units of pressure in base units are:

A) $kgm^{-1}s^{-2}$
B) $kgms^{-2}$
C) $kgm^{-2}s^{-2}$
D) None of these

Q.9 Which of the following is the least sub-multiple?

A) pico
B) femto
C) atto
D) nano

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Q.10 The units of $\frac{X}{Y}$, where $X = \frac{1}{\sqrt{\mu_o \varepsilon_o}}$ and $Y = \frac{E}{B}$, where E= electric intensity and B=magnetic intensity is:

A) $kg^0\ m\ s^{-1}$ C) $kg^0\ m^0\ s^0$

B) $kg^0\ m^0\ s^{-1}$ D) kg m s

Q.11 Units of angular acceleration are:

A) rad s^{-2} C) rad s^3

B) rad s^{-1} D) None of these

Q.12 The units of force are:

A) kg m^2 s^{-2} C) kg m s^{-2}

B) kg^2 m^2 s^{-2} D) None of these

Q.13 The units of momentum are:

A) kg m^2 s^{-1} C) kg m^{-1} s^{-2}

B) kg m s^{-1} D) kg m^2 s

Q.14 The units of power are:

A) kg m^2 s^{-2} C) kg m^2 s^{-3}

B) kg m^{-1} s^{-1} D) kg m^{-2} s^{-2}

Q.15 The base units of torque are:

A) kg m^{-1} s C) kg m^2 s^{-2}

B) kg m^2 s^{-1} D) None of these

Q.16 The units of viscosity are:

A) kg m^{-1} s C) kg m^{-1} s^{-1}

B) kg m^2 s^{-1} D) kg m^{-1} s^{-2}

Q.17 Units of impulse are same as of:

A) Momentum C) Power

B) Force D) None of these

Q.18 The base units of gravitational constant G are:

A) kg m^2 s^{-2} C) kg^2 m^{-1} s^{-2}

B) kg^{-1} m^3 s^{-2} D) kg m^{-2} s^{-1}

Q.19 One dyne is equal to:

A) 10^{-5} N C) 10^{-4} N

B) 10^{+5} N D) 10^{+4} N

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Q.20 **In the relation of Bernoulli's equation** $P + \frac{1}{2}\rho v^2 + \rho gh = \text{constant}$ **which term has same units as that of stress?**

A) P

B) $\frac{1}{2}\rho v^2$

C) ρgh

D) All of these

Q.21 **Which of the following have same units as that of the energy density (energy per unit volume)?**

A) Pressure

B) Young's modulus

C) $\frac{1}{2}\rho v^2$

D) All of these

Q.22 **What is the unit of gravitational constant? (NUMS 2016)**

A) Nm^2kg^2

B) $kgm^{-1}s^{-3}$

C) $N\,m^2\,kg^{-2}$

D) $Jmkg^{-1}$

Q.23 **Three different readings are taken by three instruments vernier caliper, meter rod and screw gauge. Which reading will be more precise?**

A) Vernier caliper's reading

B) Screw gauge's reading

C) Meter rod reading

D) All have same precision

Q.24 **Two measurements have fractional uncertainties 0.04 and 0.02, which measurement will be more accurate?**

A) Measurement with 0.04 uncertainty

B) Measurement with 0.02 uncertainty

C) Both are equally accurate

D) Can't be predicted

Q.25 **Diameter of a wire is measured by screw gauge. Which of following can be the possible value?**

A) 8.1 mm

B) 8.12 mm

C) 8.125 mm

D) 8.1250 mm

Q.26 **Two measurements** $x_1 = 10.5 \pm 0.1\text{cm}$ **&** $x_2 = 26.8 \pm 0.2$ cm **are being subtracted. The uncertainty in final answer will be:**

A) Zero

B) 0.1 cm

C) 0.2 cm

D) 0.3 cm

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Q.27 **In a square plate on increasing temperature, error in the length is 1%. The percentage error in area will be:**

A) 1%
B) 2%
C) 3%
D) 4%

Q.28 **If % age errors in moment of inertia and angular velocity are 2% and 4% respectively then % age error in rotational K.E is:**

A) 2%
B) 10%
C) 4%
D) 8%

Q.29 **The time for 20 vibrations of simple pendulum is recorded by a stop watch of least count 0.1s is 54.6 sec. The uncertainty in time period will be:**

A) 0.1 s
B) 0.001 s
C) 0.005 s
D) 0.003 s

Q.30 **For power factor formulae like $V = \frac{4\pi r^3}{3}$, %age uncertainty in V = ____.**

A) (% uncertainty in r)^3
B) 3× % uncertainty in r
C) $\frac{\%\text{ uncertainty in r}}{3}$
D) % uncertainty in r^3

Q.31 **1 femto = _____ giga?**

A) 10^{-18}
B) 10^{-15}
C) 10^{-12}
D) 10^{-24}

Q.32 **A student measures the length & diameter of cylinder by Vernier caliper both readings have an error of "0.05 mm", which type of error is in these readings:**

A) Random error
B) Personal error
C) Systematic error
D) All of these

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ANSWER KEY (Worksheet-1)

1	A	11	A	21	D	31	D
2	C	12	C	22	C	32	C
3	B	13	B	23	B		
4	B	14	C	24	B		
5	B	15	C	25	B		
6	C	16	C	26	D		
7	C	17	A	27	B		
8	A	18	B	28	B		
9	C	19	A	29	C		
10	C	20	D	30	B		

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Worksheet-2

Topic:- **Displacement, Velocity, Acceleration, Velocity-time Graph, Equations of Motion, Laws of Motion, Momentum and Conservation of Momentum, Impulse & Projectile Motion**

Q.1 **Pull of earth on a mass of 20 kg at surface of earth is:**

A) 196 N
B) 1960 N
C) 20 N
D) 19.6 N

Q.2 **Time rate of change of momentum is equal to:**

A) Force
B) Impulse
C) Velocity
D) Time

Q.3 **Distance covered by a freely falling body in 2 seconds will be:**

A) 4.9m
B) 19.6m
C) 39.2m
D) None of these

Q.4 **Expression of force due to water flow in given by:**

A) $F=\frac{mv}{t}$
B) $F = ma$
C) $F = \frac{mv^2}{r}$
D) $F = mg$

Q.5 **1st law of motion gives definition of:**

A) Mass
B) Inertia
C) Force
D) Both "A" & "B"

Q.6 **One Newton is the force:**

A) Of gravity on $\frac{1}{g}kg$ body
B) Of gravity on a 1g body
C) That gives a 1kg body an acceleration of $1ms^{-2}$
D) Both "A" and "C"

Q.7 **A 7.0 kg ball experiences a net force of 7.0 N what will be its acceleration?**

A) $10\ m\ s^{-2}$
B) $5.0\ m\ s^{-2}$
C) $1\ m\ s^{-2}$
D) $35.0\ m\ s^{-2}$

Q.8 **A force 2F acting on a particle of mass 10 kg produces an acceleration of 60 $m\ s^{-2}$. A force 5F acting on a particle of mass M produces an acceleration of 50 $m\ s^{-2}$. What is the mass M?**

A) 3.3 kg
B) 4.8 kg
C) 21 kg
D) 30 kg

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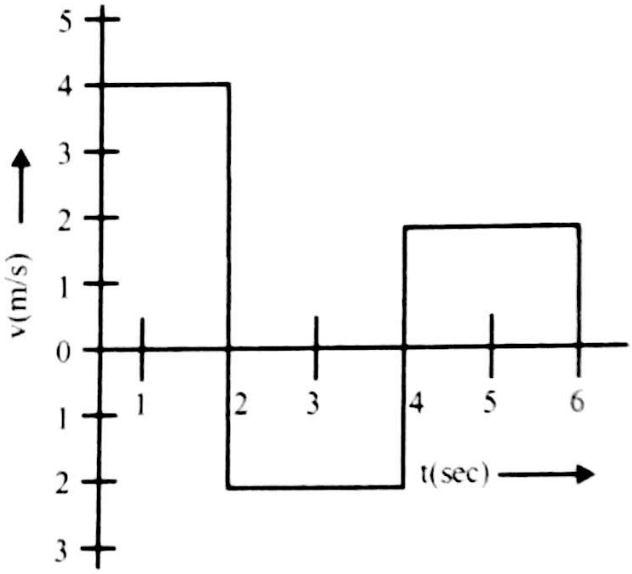
Q.9 **The Newton's 2nd law:**

A) Defines force
B) Measures force
C) Balances force
D) All of these

Q.10 **A ball of mass m_1 and another ball of m_2 are dropped from equal heights. If m_1 is twice as compared to m_2, then time taken by the balls t_1 and t_2 are related as:**

A) $t_1 = \frac{t_2}{2}$
B) $t_1 = t_2$
C) $t_1 = 4t_2$
D) $t_1 = \frac{t_2}{4}$

Q.11 **The velocity-time graph of a body moving in a straight line is shown in the figure. The displacement and distance travelled by the body in 6 sec, are respectively.**



A) 8m , 16m
B) 16m , 16m
C) 16m , 8m
D) 8m, 8m

Q.12 **A steel ball covers half the distance with velocity v_i and the other half with velocity v_f in the same straight line. The average velocity of ball is:**

A) $\frac{v_i + v_f}{2}$
B) $v_i + v_f$
C) $\frac{v_i v_f}{v_i + v_f}$
D) $\frac{2v_i v_f}{v_i + v_f}$

Q.13 **A 60 m long train is moving in a direction with speed 20 m/s. Another train moving with 30 m/s in the opposite direction and 40 m long crosses the first train in:**

A) 5 s
B) 6 s
C) 2 s
D) 4 s

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Q.14 **A car covers 2/3 distance with 60 km/h and 1/3 distance with 20 Km/h. Average speed is:**

A) 36 Km/h
B) 46 Km/h
C) 66 Km/h
D) 56 Km/h

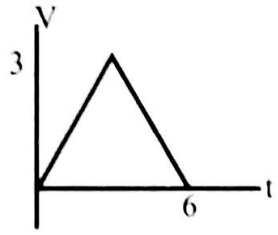
Q.15 **A person standing on a horizontal floor feels two forces: The downward pull of gravity and the upward supporting force from the floor. These two forces:**

A) Have equal magnitude and form an action/reaction pair
B) Have equal magnitude but do not form an action/reaction pair
C) Have unequal magnitudes
D) Are equal forces

Q.16 **An object with a constant speed:**

A) Is not accelerated
B) Might be accelerated
C) Is always accelerated
D) Also has a constant velocity

Q.17 **In the figure, distance covered is:**



A) 9 units
B) 6 units
C) 3 units
D) 18 units

Q.18 **The ratio of distance to magnitude of displacement when a body covers a semicircle is:**

A) $\frac{\pi}{2}$
B) πR
C) $\frac{1}{\pi}$
D) $\frac{\pi}{4}$

Q.19 **Distance travelled by a body falling freely starting from rest in the 1st, 2nd and 3rd seconds are in the ratio:**

A) 1:4:9
B) 1:3:5
C) 1:2:3
D) 1:2:5

Q.20 **A boy drops a coin from the window of a moving train. The path of coin according to a stationary observer outside the train will be:**

A) Vertical straight line
B) Parabolic
C) Elliptical
D) Circular

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Q.21 **A body is released from a height of 5 m. If friction is ignored then its velocity just before striking the ground will be ($g = 10\ m\ s^{-2}$):**

A) $5\ m\ s^{-1}$
B) $10\ m\ s^{-1}$
C) $15\ m\ s^{-1}$
D) $20\ m\ s^{-1}$

Q.22 **If momentum is increased by 20% then K.E. increases by:**

A) 44%
B) 55%
C) 66%
D) 77%

Q.23 **A boy throws a ball with velocity 10 m/s in vertically upward direction. If $g = 10\ m/s^2$, the ball rises to a height**

A) 2 m
B) 5 m
C) 10 m
D) 25 m

Q.24 **Two bodies of different masses m_1 and m_2 are dropped from two different heights h_1 and h_2. The ratio of times taken by the two bodies through these distances is:**

A) $h_1 : h_2$
B) $\frac{m_1}{m_2} : \frac{h_2}{h_1}$
C) $\sqrt{h_1} : \sqrt{h_2}$
D) $h_1^2 : h_2^2$

Q.25 **The distance traveled by a body dropped from the top of a tower is proportional to:**

A) Mass of the body
B) Height of the tower
C) Weight of the body
D) Square of the time elapses

Q.26 **An object is released from a height h above the ground reaches the ground in 8 s. The time taken by the object to cover the first half distance is:**

A) $2\sqrt{2}$ s
B) $\frac{4}{\sqrt{52}}$ s
C) $4\sqrt{2}$ s
D) None of these

Q.27 **If a body starts from a point and returns back to the same point then its:**

A) Average speed is zero but not average velocity
B) Average speed and velocity depend on the path
C) Both average speed and velocity are zero
D) Average velocity is zero but not average speed

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Q.28 **Which pair contains one scalar & one vector:**

A) Acceleration, force
B) Momentum, velocity
C) Force, K.E
D) Work, P.E

Q.29 **All statements are correct about third law of motion except:**

A) Forces have equal magnitude
B) Both forces have opposite direction
C) Both forces are applied on different bodies
D) Both are applied on same body maintaining equilibrium

Q.30 **If R is the maximum horizontal distance of projectile then the greatest height attained by projectile in this condition is:**

A) R
B) $\frac{R}{2}$
C) 2R
D) $\frac{R}{4}$

Q.31 **During projectile motion if H = R then angle of projection with horizontal is**

A) Tan^{-1} (4)
B) $Tan^{-1}\left(\sqrt{4}\right)$
C) $Tan^{-1}\left(\frac{1}{4}\right)$
D) $Tan^{-1}\left(\frac{1}{\sqrt{4}}\right)$

Q.32 **Range of projectile is R when angle of projection is 60°, then the value of other angle of projection for same range is:**

A) 40°
B) 30°
C) 50°
D) 20°

Q.33 **A person can throw a stone to maximum range of 100 m. The greatest height with same conditions to which he can make the stone to rise is:**

A) 50 m
B) 150 m
C) 100 m
D) 25 m

Q.34 **During projectile motion the quantities that remain constant are:**

A) Acceleration, v_x
B) Acceleration, K.E
C) Force, velocity
D) Acceleration, Momentum

Q.35 **The path of projectile is:**

A) Hyperbola
B) Straight line
C) Parabola
D) Ellipse

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A) One
C) Two
B) Three
D) Four

Q.37 Four projectiles are launched at angles 20°, 30°, 40° and 50° respectively. Which of these projectiles will have maximum range?

A) Projectile launched at 20°
B) Projectile launched at 50°
C) Projectile launched at 30°
D) Both projectiles launched at 40° and 50°

Q.38 Which component of the velocity of projectile remains constant throughout the motion?

A) v_x
C) Both "A" and "B"
B) v_y
D) None of these

Q.39 Which of the following factors in a projectile motion remains same?

A) v_x
C) a_x
B) a_y
D) All of these

Q.40 At which angle when a projectile is launched R=H?

A) 45°
C) 76°
B) 30°
D) 60°

Q.41 At which angle when a projectile is launched $H = \frac{R}{4}$?

A) 45°
C) 76°
B) 30°
D) 60°

Q.42 The angle between velocity of projectile and acceleration at the highest point becomes:

A) 90°
C) 0°
B) 180°
D) 76°

Q.43 A person moving in a car at a constant velocity throws an apple vertically upwards. If we ignore air friction and suppose car to move with same velocity then according to an observer standing outside.

A) Apple will follow a parabolic path and will fall again in car
B) Apple will follow a parabolic path but will fall behind car
C) Apple will follow a linear path and will fall again in car
D) Apple will follow a parabolic path but will fall before car

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Q.44 **Two balls are thrown at angles of θ and (90°-θ) with the horizontal with same speed. Ratio of their time of flights is:**

A) $\tan^2\theta : 1$

B) $1 : \tan\theta$

C) $\tan\theta : 1$

D) 1:1

Q.45 **A bomber drops its bomb when it is vertically above the target, it misses the target due to (falls ahead):**

A) Air resistance

B) Horizontal component of velocity

C) Vertical component of velocity

D) Gravity

Q.46 **The maximum height of projectile has the largest value for which of the following angles of projection?**

A) 0°

B) 60°

C) 30°

D) 75°

Q.47 **A body drops a coin from the window of a moving train. The path of coin according to a stationary observer inside the train will be:**

A) Vertical straight line

B) Elliptical

C) Parabolic

D) Circular

Q.48 **A ball whose K.E is E, is projected at an angle of 45° with vertical then, its K.E at maximum height is**

A) E

B) $\frac{E}{\sqrt{2}}$

C) $\frac{E}{2}$

D) 2E

Q.49 **In a competition, fielders are required to throw the cricket hard ball as far as possible. Under ideal conditions, the optimum throwing angle is 45°. What should this angle, with respect to ground, be in (i) Strong winds against the direction of throw; and (ii) Strong winds in the direction of throw?**

A) (i) more than 45°, (ii) less than 45°

B) (i) less than 45°, (ii) more than 45°

C) 45° in both cases

D) Depends on throwing speed

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ANSWER KEY (Worksheet-2)

1	A	11	A	21	B	31	A	41	A
2	A	12	D	22	A	32	B	42	A
3	B	13	C	23	B	33	D	43	A
4	A	14	A	24	C	34	A	44	C
5	C	15	B	25	D	35	C	45	B
6	D	16	B	26	C	36	C	46	D
7	C	17	A	27	D	37	D	47	A
8	D	18	A	28	C	38	A	48	C
9	B	19	B	29	D	39	D	49	C
10	B	20	B	30	D	40	C		

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Worksheet-3

Topic:- Moment of Force, Equilibrium & Conditions

Q.1 **Center of gravity of triangular plate lies at the:**

A) Intersection point of medians

B) Intersection of perpendicular bisectors

C) Intersection of the altitudes

D) All of these

Q.2 **Center of mass of body lies:**

A) Always lies outside the body

B) May or may not be inside the body

C) Always lies inside the body

D) Can't be predicted

Q.3 **If the centre of gravity of a body does not shift when it is disturbed then the body is said to be in?**

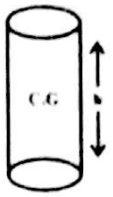
A) Stable equilibrium

B) Unstable equilibrium

C) Neutral equilibrium

D) Rotational equilibrium

Q.4 **Centre of gravity of a uniform rod of height 'h' is at a distance of:**



A) h

B) $\frac{h}{2}$

C) $\frac{h}{3}$

D) $\frac{h}{4}$

Q.5 **Torque is analogous to force for:**

A) Translatory motion

B) Vibratory motion

C) Rotational motion

D) Linear motion

Q.6 **The direction of torque in earth considering it to be an inertial frame of reference is:**

A) Anti-clock wise

B) Clock wise

C) Along axis of rotation

D) Has no torque

Q.7 **The torque produced by the weight of the body about the centre of gravity will be:**

A) mgr

B) Zero

C) $\vec{w} \times \vec{r}$

D) $\vec{r} \times \vec{F}$

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Q.8 **Work done by torque will be equal to:**

A) Fd

B) $r\theta$

C) $I\alpha$

D) $\tau 0$

Q.9 **As for translational motion we use relation F=ma similarly for angular motion this relation appears as:**

A) $\tau = m\alpha$

B) $\tau = Ia$

C) $\tau = I\alpha$

D) None of these

Q.10 **If the line of action of force passes through the axis of rotation, then the value of torque will be:**

A) Maximum

B) Zero

C) Negative

D) Positive

Q.11 **What is not true of the two forces that give rise to couple?**

A) They act in opposite direction

B) They both act on the same body

C) They both act at the same point

D) They both have the same magnitude

Q.12 **When a body is disturbed from it's equilibrium state such that it is said to be in stable equilibrium then?**

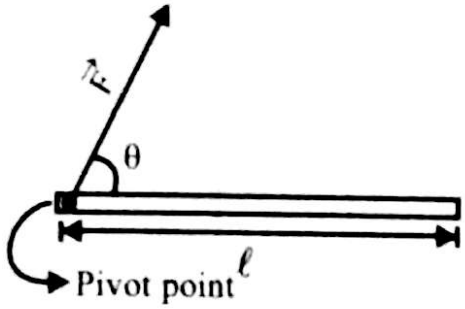
A) It returns to equilibrium position if released

B) It's P.E increases

C) It's line of action of weight remains within same base area

D) All of these

Q.13 **For which value of "θ" in the figure shown torque becomes maximum?**



A) 0°

B) 90°

C) 180°

D) Not Possible

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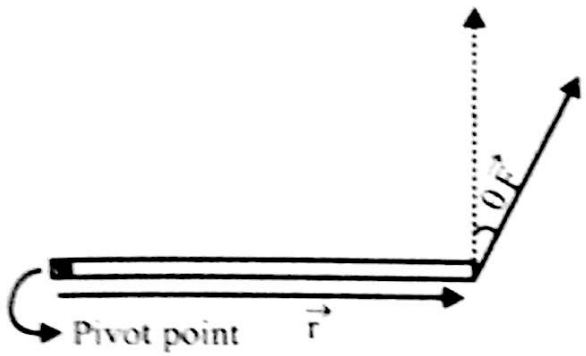
Q.14 **A force $\vec{F}$ acts on a rod as shown in the figure. What is the relation for torque in it?**

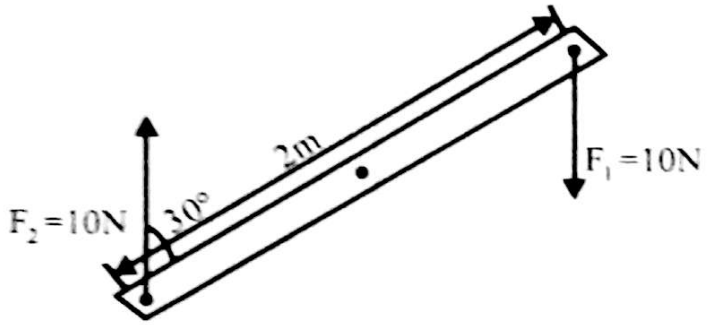


A) $\tau = rF\sin\theta$
C) $\tau = rF\tan\theta$
B) $\tau = rF\cos\theta$
D) $\tau = rF\cot\theta$

Q.15 **In above Question for which value of "θ" torque becomes maximum?**

A) θ=90°
C) Both "A" and "B"
B) θ=270°
D) θ=0°

Q.16 **Consider the figure in which two forces act on a single rod of length 2 m as shown. What will be the value of moment of couple produced?**



A) 20 N m
C) 5 N m
B) 10 N m
D) 30 N m

Q.17 **The rate of change of angular momentum is equal to:**

A) Linear momentum
C) Torque
B) Force
D) None of these

Q.18 **The angular momentum of an object changes from 100 Js to 300 J s in 2 sec. What will be the torque acting on it?**

A) 100 N m
C) 150 N m
B) 300 N m
D) 0 N m

Q.19 **Two objects having moment of inertia I_1:I_2=2:1. What will be the ratio of their respective rate of change of angular momenta (consider first object to be in equilibrium)?**

A) 2:1
C) 0
B) 1:2
D) ∞

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Q.20 **An object is said to be in complete equilibrium if:**

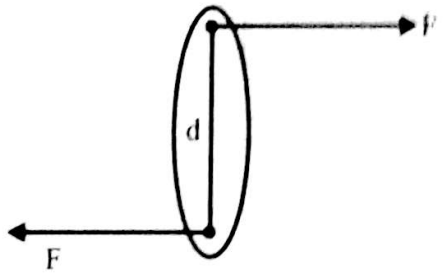
A) $\sum \vec{F} = 0, \sum \vec{\tau} \neq 0$

B) $\sum \vec{F} \neq 0, \sum \vec{\tau} = 0$

C) $\sum \vec{F} = 0, \sum \vec{\tau} = 0$

D) $\sum \vec{F} \neq 0, \sum \vec{\tau} \neq 0$

Q.21 **What will be expression for moment of couple in the figure:**



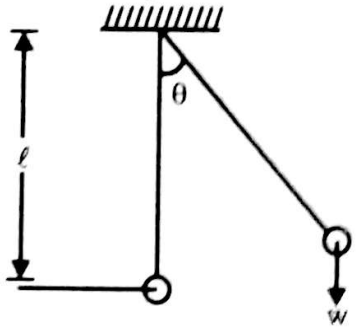
A) dF

B) dF/2

C) 2dF

D) dF cosθ

Q.22 **The expression of torque for following figure will be:**



A) mg ℓ cosθ

B) mg ℓ sinθ

C) mg ℓ

D) None of these

Q.23 **The types of a car moving on road with constant velocity in a straight line are in _____ equilibrium.**

A) Translational

B) Rotational

C) Dynamic

D) All of these

Q.24 **The unit of "couple of forces" is same as that of:**

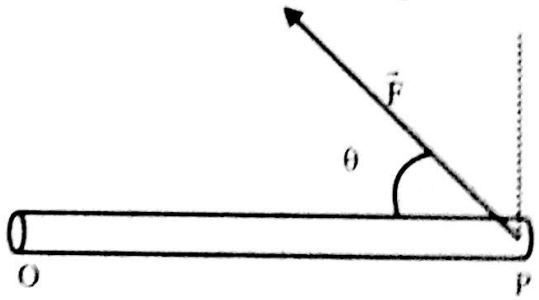
A) Force

B) Torque

C) Moment of couple

D) Both B & C

Q.25 **A force F is acting at point 'P' of uniform rod capable to rotate about "O" what is the torque about "O":**



A) OPFsinθ

B) OPFcosθ

C) OPFtanθ

D) OPF

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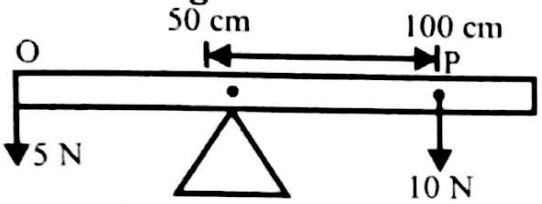
Q.26 **A door requires a minimum torque of 100 Nm in order to open it. What is the minimum distance of the handle from the hinge, if the door is to be pulled open with a force at the handle not greater than 50 N.**

A) 0.33 m
C) 0.71 m
B) 2.0 m
D) 1.54 m

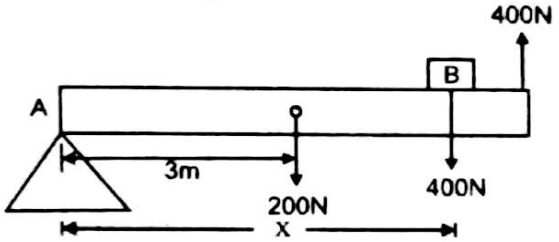
Q.27 **Two forces 5 N and 10 N are acting at 'O' and 'P' respectively on a uniform rod of length 100 cm suspended at the position of centre of gravity 50 cm mark as shown in fig.**



What is the position of P on meter rod?

A) 80 cm
C) 75 cm
B) 70 cm
D) 65 cm

Q.28 **A uniform beam of 200 N is supported horizontally as show in fig. If the breaking tension of the rope is 400 N, how far can the block B of weight 400 N from point A on the beam as shown in fig.**

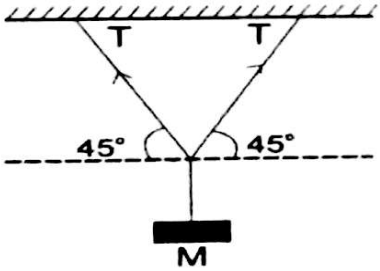


A) 75 cm
C) 400 cm
B) 300 cm
D) 450 cm

Q.29 **A uniform rod 30 cm long is pivoted at its centre. A 40-newton weight is hung 5 cm from the left end. Where must a 50-newton weight be hung to maintain equilibrium?**

A) 5 cm from right end
C) 6 cm from right end
B) 7 cm from right end
D) 8 cm from right end

Q.30 **A block of mass M shown in the figure below hangs motionless. What is the tension in each of the ropes?**



A) Mg
C) $\frac{Mg}{\sqrt{2}}$
B) $\frac{Mg}{2}$
D) $2Mg$

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ANSWER KEY (Worksheet-3)

1	A	11	C	21	A
2	B	12	D	22	B
3	C	13	D	23	D
4	B	14	B	24	A
5	C	15	D	25	A
6	D	16	B	26	B
7	B	17	C	27	C
8	D	18	A	28	D
9	C	19	C	29	B
10	B	20	C	30	C

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Worksheet-4

Topic:- Work, Kinetic & Potential Energy, Inter Conversion of K.E & P.E, Power, Angular Displacement, Angular Velocity, Centripetal Force & Geostationary Orbits

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Q.1 When a person lifts a body from ground work done by the lifting force is?

A) Positive
C) Negative
B) Zero
D) 1

Q.2 When a person lifts a body from ground work done by force of gravity is?

A) Positive
C) 1
B) Negative
D) Zero

Q.3 A force of $3\hat{i} + 4\hat{j}$ N displaces the body through $4\hat{i} + 3\hat{j}$ m the work done will be:

A) 12 J
C) 28 J
B) 24 J
D) – 12 J

Q.4 The following four particles have same K.E, then which of them has maximum momentum:

A) Proton
C) Positron
B) Electron
D) α-particle

Q.5 The power of a pump which can pump 100 kg of water to a height of 100 m in 5 sec is:

A) 20 kW
C) 40 kW
B) 200 kW
D) 4 kW

Q.6 1 MWh is equal to:

A) 3.6×10^8 J
C) 3.6 MJ
B) 3.6 J
D) 3.6×10^9 J

Q.7 Work done is equal to:

A) Change in K.E
C) Change in elastic P.E
B) Change in P.E
D) All of these

Q.8 Which of the following is unit of P.E:

A) eV
C) Joule
B) Calorie
D) All of these

Q.9 Slope of energy time graph is equal to:

A) Acceleration
C) Power
B) Momentum
D) Work

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Q.10 Moving body may not have:

A) K.E
B) Momentum
C) P.E
D) All of these

Q.11 The dimensions of power are:

A) $[MLT^{-1}]$
B) $[MLT^{-2}]$
C) $[ML^2T^{-3}]$
D) $[ML^2T^3]$

Q.12 Which of the following work is greater?

A) +100J
B) -100J
C) +200J
D) -1000J

Q.13 For which angle work is said to be +ve maximum?

A) 0°
B) 180°
C) 90°
D) 60°

Q.14 For which angle work is said to be –ve maximum?

A) 0°
B) 180°
C) 90°
D) 60°

Q.15 For which angle work is said to be maximum?

A) 0°
B) 180°
C) Both "A" and "B"
D) None of these

Q.16 A force of 20 N acts on a body through a distance of 10 m. what must be the angle between force and displacement such that work comes out to be 100 J?

A) 90°
B) 0°
C) 30°
D) 60°

Q.17 For what angle between $\bar{F}$ and $\bar{d}$ work reduces to half of its maximum value?

A) 60°
B) 30°
C) 45°
D) 90°

Q.18 A loaded and an unloaded cart are moving with same kinetic energies such that same retarding force acts on them and they finally stop after covering "S_1" and "S_2" distances respectively, which of the following is true?

A) $S_1=S_2$
B) $S_1<S_2$
C) $S_1>S_2$
D) None of these

Q.19 When gravitational field does negative work then P.E of body.

A) May increase
B) May decrease
C) Must increase
D) Must decrease

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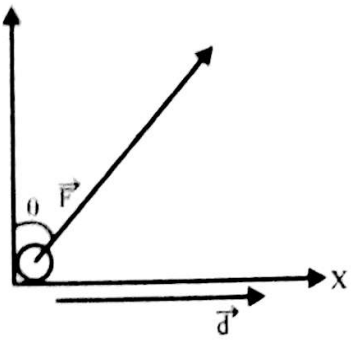
Q.20 **Consider the figure in which a force $\vec{F}$ acts on a body through displacement $\vec{d}$**



For which value of "θ" work is said to be maximum?

A) 0° C) Both "A" & "B"

B) 180° D) 90°

Q.21 **Considering figure of Question 21 what will be the mathematical formula for the calculation of work?**

A) $W = Fd\cos\theta$ C) $W = Fd\tan\theta$

B) $W = Fd\sin\theta$ D) None of these

Q.22 **A force of 2 N acts on body for 1 m distance, the maximum work done is:**

A) 2 units C) 5 units

B) 3 units D) 6 units

Q.23 **A mass is lifted to a height in 10 sec. Now if the same mass is lifted to the same height in 20 sec then work done in two cases are in the ratio:**

A) 1:2 C) 1:1

B) 2:1 D) 4:1

Q.24 **A body is released from a height of 5 m. If friction is ignored then its velocity just before striking the ground will be ($g = 10\ ms^{-2}$):**

A) 5 m/s C) 15 m/s

B) 10 m/s D) 20 m/s

Q.25 **The direction of angular displacement is:**

A) Along axis of rotation

B) In the plane of rotation

C) Perpendicular to plane of rotation

D) Both A and C

Q.26 **The angular velocity of spin motion of earth is:**

A) $\frac{\pi}{12}$ rev min^{-1} C) $\frac{\pi}{4}$ rev min^{-1}

B) $\frac{\pi}{6}$ rad h^{-1} D) $\frac{\pi}{12}$ rad h^{-1}

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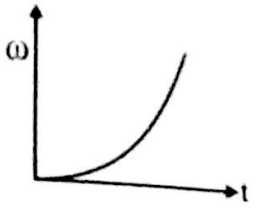
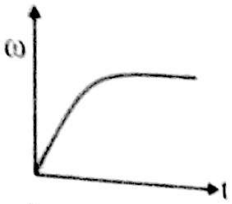
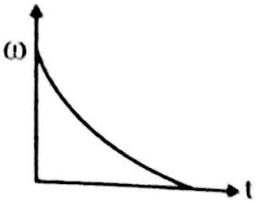
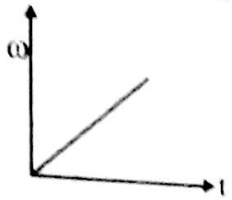
Q.27 The angular velocity time graph which corresponds to constant angular acceleration is:

A) 

C) 

B) 

D) 

Q.28 The ratio of dimensions of angular acceleration to angular velocity gives dimensions of:

A) Time

B) Length

C) Frequency

D) Mass

Q.29 An electric fan rotating at $3\frac{rev}{s}$ is switched off. It comes to rest in 18 s. What will be the deceleration produced?

A) $0.5\ \frac{rev}{s^2}$

B) $0.25\ \frac{rev}{s^2}$

C) $0.2\ \frac{rev}{s^2}$

D) $0.16\ \frac{rev}{s^2}$

Q.30 If the radius of a circle is doubled keeping same angular velocity, then centripetal force becomes:

A) Double

B) Remains same

C) Half

D) Reduces by four times

Q.31 Time period of the orbital motion of a geostationary satellite is:

A) 5060 sec

B) 84 min

C) 24 hour

D) Any of these

Q.32 Which one is not true about communication satellites?

A) They use microwaves to communicate

B) Minimum three correctly positioned satellites are required for global coverage.

C) Their orbital speed is greater than orbital speed of low flying satellites

D) None of these

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ANSWER KEY (Worksheet-4)

1	A	11	C	21	B	31	C
2	B	12	D	22	A	32	C
3	B	13	A	23	C		
4	D	14	B	24	B		
5	A	15	C	25	D		
6	D	16	D	26	D		
7	D	17	A	27	D		
8	D	18	A	28	C		
9	C	19	C	29	D		
10	C	20	D	30	A		

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Worksheet-5

Topic:- SHM, SHM and Uniform Circular Motion, Simple Pendulum, Conservation of Energy in SHM, Free and Forced Oscillations, Resonance & its Applications

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Q.1 The product of angular frequency (ω) and time period will be:

A) 1 C) 2π

B) $\frac{\pi}{2}$ D) π

Q.2 A simple pendulum is oscillating in a lift. If the lift starts moving upwards with a uniform acceleration then the time period will:

A) Remain unaffected C) Be longer

B) Be shorter D) May be "B" or "C"

Q.3 A particle is executing S.H.M, then the graph of velocity as a function of displacement is:

A) Straight line C) Ellipse

B) Circle D) Hyperbola

Q.4 A particle is executing S.H.M, then the graph of acceleration as a function of displacement is:

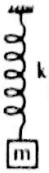
A) Straight line C) Ellipse

B) Circle D) Hyperbola

Q.5 A particle executing SHM has an acceleration of 64 cm s^{-2} when its displacement is 4cm, its period in seconds is:

A) $\pi/2$ C) π

B) $\pi/4$ D) 2π

Q.6 If time period of this 

is T, then the time period of this

will be:

A) $T/\sqrt{2}$ C) $T/2$

B) $\sqrt{2}\,T$ D) 2T

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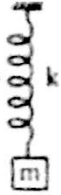
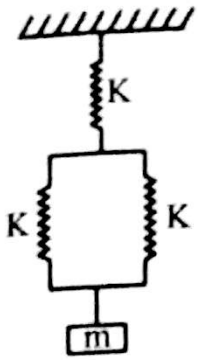
Q.7 **If the time period of** 

is T, then the time period of this



this will be:

A) $T/\sqrt{2}$

B) $T/2$

C) $\sqrt{2}\,T$

D) $\sqrt{\frac{3}{2}}T$

Q.8 **At t = 0 a body performing SHM is at mean position, when** $t = T/4$ **it will be at:**

A) At extreme position
B) Between mean and extreme position
C) Beyond extreme position
D) Again at mean position

Q.9 **The displacement of particle in SHM in one time period if its amplitude of vibration is "a" will be:**

A) Zero
B) a
C) 2a
D) 4a

Q.10 **A system can vibrate only if it has:**

A) Inertia
B) Restoring force
C) Plasticity
D) Both "A" and "B"

Q.11 **The maximum velocity of harmonic oscillator is** $10\,cm/s$ **. If its amplitude is 10 cm. What is its maximum acceleration?**

A) $100\ cm/s^2$

B) $1\ cm/s^2$

C) $10\ cm/s^2$

D) None of these

Q.12 **The time in which a body executing SHM is at a distance of** $\frac{x_o}{2}$ **from the mean position is (where T is its time period):**

A) $\frac{T}{2}$

B) $\frac{T}{4}$

C) $\frac{T}{8}$

D) $\frac{T}{12}$

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Q.13 **A particle execute SHM with a time period of 2 s and amplitude 5 cm. Maximum magnitude of its velocity is:**

A) $10\ \pi$ cm/s

B) $20\ \pi$ cm/s

C) $2.5\ \pi$ cm/s

D) $5\ \pi$ cm/s

Q.14 **The time period of simple pendulum measured inside a stationary lift is T. If the lift starts moving upward with an acceleration of g, what will be the time period?**

A) $\frac{T}{3}$

B) $\frac{T}{\sqrt{2}}$

C) $\sqrt{\frac{3}{2}}T$

D) $\frac{\sqrt{3}}{2}T$

Q.15 **The bob of a simple pendulum of period T is given a negative charge. If it is allowed to oscillate above a positively charged plate, the new time period will be:**

A) Equal to T

B) More than T

C) Less than T

D) Infinite

Q.16 **The relation of restoring force in a simple pendulum if it makes an angle "θ" with horizontal is:**

A) $mg \sin\theta$

B) $mg \tan\theta$

C) $mg \cos\theta$

D) $mg \cot\theta$

Q.17 **The time period of variation in total energy of a simple harmonic oscillator is:**

A) 2T

B) $\frac{T}{2}$

C) 0

D) Infinite

Q.18 **The frequency of variation in K.E or P.E of a simple harmonic oscillator is:**

A) f

B) $2f$

C) $3f$

D) $\frac{f}{2}$

Q.19 **The maximum number of equal parts in which time period of a simple harmonic oscillator can be divided are:**

A) 4

B) 6

C) 8

D) Infinite

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Q.20 **The relation for time period of a horizontal mass spring system is $T = 2\pi\sqrt{\frac{x}{g}}$. What will be it's time period if taken on moon (at moon $g_m = \frac{g}{6}$).**

A) T will increase

B) T will remain same

C) T will decrease

D) T may increase or decrease

Q.21 **k is spring constant, its unit and dimension are same as that of:**

A) Pressure

B) Tension

C) Surface tension

D) Energy

Q.22 **The spring constant of two springs are added for maximum equivalent when they are connected in:**

A) Series

B) Parallel

C) Perpendicular

D) None of these

Q.23 **When a spring of spring constant k is cut into two parts of same length, then the effective value of spring constant is:**

A) 2k

B) k

C) $\frac{k}{2}$

D) $\frac{k}{4}$

Q.24 **If the displacement in SHM is written by equation $x = x_o\cos\omega t$ the value of initial phase in this case is:**

A) 0°

B) 45°

C) 90°

D) 180°

Q.25 **Spring constant of a spring and its length are related as:**

A) $k \propto l$

B) $k \propto l^{-1}$

C) $k \propto \sqrt{l}$

D) $k \propto l^{-\frac{1}{2}}$

Q.26 **A simple pendulum has frequency of 2 Hz. How long does it take to move from mean to extreme position:**

A) 0.12 s

B) 0.2 s

C) 0.5 s

D) 0.05 s

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Q.27 **Equation for displacement in SHM is $x = x_0 \sin\omega t$. The value of acceleration at instant $t = \frac{T}{4}$ is:**

A) $x_0\omega$

B) $x_0\omega^2$

C) $x_0\sqrt{\omega}$

D) $x_0\frac{\omega}{2}$

Q.28 **The relation for instantaneous velocity for a simple harmonic oscillator is:**

A) $v = \omega\sqrt{x_0^2 - x^2}$

B) $v = \sqrt{\frac{g}{\ell}\left(x_0^2 - x^2\right)}$

C) $v = \sqrt{\frac{k}{m}\left(x_0^2 - x^2\right)}$

D) All of these

Q.29 **Which of the following can be true for "ω"?**

A) $\sqrt{\frac{k}{m}}$

B) $\frac{2\pi}{T}$

C) $\sqrt{\frac{g}{\ell}}$

D) All of these

Q.30 **For a simple harmonic oscillator which of the following is true for maximum acceleration?**

A) $a = -\omega^2 x_0$

B) $a = \frac{-g}{\ell}x_0$

C) $a = \frac{-k}{m}x_0$

D) All of these

Q.31 **The ratio of maximum velocity and maximum acceleration for simple harmonic oscillator can be written as:**

A) $\frac{T}{2\pi}$

B) $\sqrt{\frac{m}{k}}$

C) $\sqrt{\frac{\ell}{g}}$

D) All of these

Q.32 **The displacement covered by a simple harmonic oscillator in a time of $\frac{3}{2}T$ while starting from extreme position with amplitude "a":**

A) Zero

B) 2a

C) 4a

D) 6a

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Q.33 **Referring to data in question # 32, the distance covered is:**

A) Zero
B) 2a
C) 4a
D) 6a

Q.34 **The time taken by a simple harmonic oscillator to travel from extreme to half of mean $\left(x = \frac{x_o}{2}\right)$ is:**

A) $\frac{T}{4}$
B) $\frac{T}{12}$
C) $\frac{T}{8}$
D) $\frac{T}{6}$

Q.35 **A simple harmonic oscillator starts it's journey from mean and moves towards +ve extreme then what is true?**

A) It's initial phase is zero
B) We use $x = x_o \cos\theta$ for it
C) We use $x = x_o \sin\theta$ for it
D) Both "A" & "C"

Q.36 **Which of the following equations can be used for a simple harmonic oscillator?**

A) $x = x_o \sin\theta$
B) $x = -x_o \cos\theta$
C) $x = x_o \cos\theta$
D) All of these

Q.37 **A uniform circular motion is:**

A) A periodic motion only
B) A simple harmonic motion only
C) Both periodic and harmonic motion
D) Neither periodic not harmonic motion

Q.38 **In SHM when K.E is maximum then which of the following is incorrect?**

A) P.E is zero
B) Acceleration is zero
C) Displacement is zero
D) None of these

Q.39 **A pendulum has time period T on earth. As the value of g on the surface of moon is $\frac{1}{6}$th times than on earth, then the time period of such a pendulum on the moon's surface will be:**

A) $\sqrt{6}T$
B) $\frac{T}{\sqrt{6}}$
C) $\frac{T}{6}$
D) 6T

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Q.40 **A simple pendulum is present in a lift which is accelerated downwards by g, then its time period in lift will become:**

A) $\frac{1}{\sqrt{2}}$ times

C) $\frac{2}{\sqrt{3}}$ times

B) 2 times

D) Infinite

Q.41 **In SHM when displacement is equal to $\frac{x_o}{2}$, then the ratio of P.E to K.E is:**

A) 2:3

C) 3:2

B) 1:3

D) 3:1

Q.42 **In simple pendulum at any instant tension of string is _____ when it makes angle "θ" with horizontal is:**

A) $T = mg$

C) $T = mg \sin\theta$

B) $T = mg \cos\theta$

D) $T = - mg \sin\theta$

Q.43 **In SHM how many times does K.E and P.E become equal during one period?**

A) 1 time

C) 3 times

B) 2 times

D) 4 times

Q.44 **When K.E and P.E in SHM become equal the displacement is?**

A) $\frac{x_o}{2}$

C) $\sqrt{2}x_o$

B) $\frac{x_o}{\sqrt{2}}$

D) $\frac{\sqrt{3}x_o}{2}$

Q.45 **The time period of a simple pendulum is independent of:**

A) Length of pendulum

C) Value of gravity

B) Centre of mass

D) None of these

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ANSWER KEY (Worksheet-5)

1	C	11	C	21	C	31	D	41	B
2	B	12	D	22	B	32	B	42	C
3	C	13	D	23	A	33	D	43	D
4	A	14	B	24	C	34	D	44	B
5	A	15	C	25	B	35	D	45	D
6	B	16	C	26	A	36	D		
7	D	17	D	27	B	37	A		
8	A	18	B	28	D	38	D		
9	A	19	A	29	D	39	A		
10	D	20	B	30	D	40	D		

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Worksheet 8

Topic:- Mechanical Waves, Stationary Waves in Air Columns and Stretched String, Doppler's Effect & its Applications

Q.1 Doppler's effect applies to:

A) Sound wave only

B) Light wave only

C) Both sound and light waves

D) Neither sound nor light waves

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Q.2 **When the source of sound approaches the listener at rest, the frequency or pitch of sound received by him is:**

A) Less than the frequency of sound produced by source

B) Greater than the frequency of sound produced by source

C) Same as that produced by source

D) Can't be predicted

Q.3 **When the source of sound moves away from a stationary listener there is:**

A) An apparent increase in wavelength

B) An apparent decrease in frequency

C) An apparent decrease in wavelength

D) Both "A" & "B"

Q.4 **Which phenomenon can be applied to estimate the velocity of star with respect to earth:**

A) Doppler's effect

B) Interference

C) Stationary waves

D) All of these

Q.5 **The phase change of 180° is equal to the path difference of:**

A) λ

B) $\frac{\lambda}{2}$

C) 2λ

D) 3λ

Q.6 **In the following properties of a wave, the one that in independent of the others is:**

A) Velocity

B) Amplitude

C) Frequency

D) Wavelength

Q.7 **When you speak to your friend, and he speaks to you, which of following quantity is same in their sounds:**

A) Amplitude

B) Wave velocity

C) Frequency

D) Wavelength

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Q.8 **Wave motion cannot transfer:**

A) Energy
B) Momentum
C) Mass
D) All of these

Q.9 **When a transverse wave is reflected from boundary of denser medium which of its characteristics are not changed?**

A) Wavelength
B) Phase
C) Frequency
D) Wavelength & frequency

Q.10 **An explosion takes place on the surface of a planet, a person at surface of earth:**

A) Can see only but can't hear explosion
B) Can't see but only hear explosion
C) Both see and hear explosion
D) Can't be predicted

Q.11 **The waves which need medium for their propagation are called:**

A) Electromagnetic waves
B) Mechanical waves
C) Non-mechanical waves
D) Matter waves

Q.12 **The waves which do not require a material medium for their propagation are:**

A) Electromagnetic waves
B) Non-mechanical waves
C) Mechanical waves
D) Both "A" and "B"

Q.13 **Mechanical waves can be:**

A) Longitudinal only
B) Transverse only
C) Both longitudinal and transverse
D) None of these

Q.14 **The relation between phase difference ϕ and path difference x is:**

A) $\phi = \frac{2\pi x}{\lambda}$
B) $\phi = \frac{2\pi\lambda}{x}$
C) $\phi = \frac{2\pi}{x}$
D) $\phi = \frac{2\pi}{\lambda}$

Q.15 **When a longitudinal wave gets reflected from a denser boundary then?**

A) Compression is converted into rarefaction
B) Rarefaction is converted into compression
C) Both "A" & "B"
D) No phase change occurs

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Q.16 **When two identical waves moving in opposite direction reach at a point simultaneous such that they have same frequency then:**

A) Interference takes place

B) Stationary waves are generated

C) Beats are produced

D) None of these

Q.17 **We can produce stationary waves in:**

A) Stretched string

B) Air coloumn

C) Both "A" and "B"

D) None of these

Q.18 **In stationary waves generated on stretched string the relation for speed of wave will be:**

A) $v \propto \sqrt{F}$

B) $v \propto \frac{1}{\sqrt{m}}$

C) Both "A" and "B"

D) None of these

Q.19 **If for a stretched string tension is made from "F" to "4F" the speed of waves generated will be:**

A) $v' = 4v$

B) $v' = 2v$

C) $v' = \frac{v}{4}$

D) $v' = \frac{v}{2}$

Q.20 **To produce a single harmonic in a stretched string we will pluck it from:**

A) $\frac{\ell}{4}$

B) $\frac{\ell}{2}$

C) $\frac{\ell}{6}$

D) $\frac{\ell}{8}$

Q.21 **For stationary waves in a stretched string we always have _____ on two ends:**

A) Node

B) Anti-node

C) Both "A" and "B"

D) None of these

Q.22 **The distance between two nodes or anti-nodes is always:**

A) $\frac{\lambda}{4}$

B) $\frac{\lambda}{2}$

C) $\frac{\lambda}{6}$

D) λ

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Q.23 **The relation for fundamental frequency of stationary waves in stretched string is:**

A) $f_1 = \frac{v}{2\ell}$

B) $f_1 = \frac{v}{4\ell}$

C) Both "A" & "B"

D) None of these

Q.24 **The relation for fundamental wavelength of stationary waves generated in stretched string is:**

A) $\lambda_1 = 2\ell$

B) $\lambda_2 = 4\ell$

C) Both "A" & "B"

D) None of these

Q.25 **As the frequency for stationary waves in stretched string increases the value of:**

A) Wavelength decreases

B) Speed remains same

C) Both "A" and "B"

D) Both wavelength & speed decreases

Q.26 **What is true for first overtone?**

A) $f_2 = 2f_1$

B) $v = constant$

C) $\lambda_2 = \frac{\lambda_1}{2}$

D) All of these

Q.27 **If the tension in the string is doubled, then speed of stationary wave will:**

A) Remains same

B) Increase by $\sqrt{2}$

C) Decrease by $\sqrt{2}$ times

D) Increase by 2 times

Q.28 **The minimum length of a tube, open at both ends, that resonates with a tuning fork of frequency 350 Hz is (where speed of sound is 350 m s^{-1}):**

A) 0.25 m

B) 1 m

C) 0.5 m

D) 2 m

Q.29 **The wavelength of fundamental mode of vibration of closed organ pipe is:**

A) 2ℓ

B) ℓ

C) 4ℓ

D) $\frac{\ell}{2}$

Q.30 **If two waves are superimposed to form a stationary wave, what will be speed of wave having frequency 300 Hz while the distance between the two nodes is 1.5 m:**

A) 100 m s^{-1}

B) 450 m s^{-1}

C) 200 m s^{-1}

D) 900 m s^{-1}

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ANSWER KEY (Worksheet-6)

1	C	11	B	21	A
2	B	12	D	22	B
3	D	13	C	23	A
4	A	14	A	24	A
5	B	15	D	25	C
6	B	16	B	26	D
7	B	17	C	27	B
8	C	18	C	28	C
9	D	19	B	29	C

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Worksheet-7

Topic:- **Interference of Light Waves, Young's Double Slit Experiment, Diffraction Grating and Optical Fibers**

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Q.1 **The wave nature of light was proposed by:**

A) Thomas Young
B) Maxwell
C) Fresnel
D) Huygen

Q.2 **Huygen's principle states that:**

A) Light travels in straight line
B) Light travels as electromagnetic waves
C) Light has dual nature
D) All points on primary wave front are sources of secondary wavelets

Q.3 **The distance between any two Consecutive dark or bright fringes is called:**

A) Wave length
B) Wavelet
C) Amplitude
D) Fringe spacing

Q.4 **In Young's double slit experiment the condition for constructive interference (bright fringes) is:**

A) $d\sin\theta = \left(m+\frac{1}{2}\right)\lambda$
B) $d\sin\theta = m\lambda$
C) $d\sin\theta = \left(m-\frac{1}{2}\right)\frac{\lambda}{2}$
D) $2d\sin\theta = m\lambda$

Q.5 **In Young's double slit experiment the condition for destructive interference is:**

A) $d\sin\theta = m\lambda$
B) $d\sin\theta = \frac{m\lambda}{2}$
C) $d\sin\theta = \left(\frac{m}{2}-\frac{1}{2}\right)\lambda$
D) $d\sin\theta = \left(m+\frac{1}{2}\right)\lambda$

Q.6 **In Young's double slit experiment fringe spacing is equal to:**

A) $\frac{d}{\lambda L}$
B) $\frac{\lambda L}{d}$
C) $\frac{\lambda d}{L}$
D) $\frac{2\lambda d}{L}$

Q.7 **Longitudinal waves do not exhibit:**

A) Reflection
B) Refraction
C) Diffraction
D) Polarization

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Q.8 **Diffraction is a special type of:**

A) Polarization
B) Interference
C) Reflection
D) None of these

Q.9 **The appearance of colours in thin film is due to:**

A) Diffraction
B) Dispersion
C) Interference
D) Polarization

Q.10 **Newton's rings are formed due to:**

A) Diffraction of light
B) Interference of light
C) Polarization of light
D) Reflection of light

Q.11 **When Newton's rings interference is seen from above by means of reflected light the central spot is?**

A) Red
B) Blue
C) Bright
D) Dark

Q.12 **Bending of light around the edges of an obstacle is called:**

A) Refraction
B) Interference
C) Polarization
D) Diffraction

Q.13 **In YDSE the process taking place was:**

A) Interference
B) Diffraction
C) Both "A" and "B"
D) None of these

Q.14 **To observe interference of light interfering beams must:**

A) Be monochromatic
B) Be coherent
C) Of same color
D) All of these

Q.15 **In "YDSE" the centre is:**

A) Always bright
B) Always dark
C) May be bright or dark
D) None of these

Q.16 **The centre of Newton's rings in case of transmitted light is:**

A) Bright
B) Dark
C) May be bright or dark
D) None of these

Q.17 **The blue colour of sky is due to _____ of light:**

A) Diffraction
B) Scattering
C) Interference
D) None of these

Q.18 **A diffraction pattern is obtained using a beam of red light. If the red light is replaced by blue light, then:**

A) The diffraction pattern remains unchanged
B) Diffraction bands become narrower and crowded together
C) Bands become broader and farther apart
D) Bands disappear

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Q.19 **Two coherent sources produce a dark fringe when the phase difference between interfering waves is:**

A) $(2n-2)\pi$, n= 1, 2, 3 ...
B) $n\pi$
C) 2π
D) $(2n-1)\pi$, n = 1, 2, 3, 4

Q.20 **In Young's double slit experiment the distance between the slits is gradually increased. The width of the fringes:**

A) Increases
B) Remains same
C) Decreases
D) First increases and then decreases

Q.21 **The image of the tip of a needle is never sharp because of:**

A) Polarization of light
B) Interference of light
C) Diffraction of light
D) Reflection of light

Q.22 **When interference of light takes place?**

A) Energy is created at the position of maxima
B) Energy is destroyed at the position of minima
C) Energy is neither created nor destroyed but it is merely redistributed
D) All of these

Q.23 **If the apparatus of Newton's Rings is moved from air to water, the rings spacing:**

A) Remains same
B) Increases
C) Decreases
D) Becomes maximum

Q.24 **In YDSE the process under observation is:**

A) Interference
B) Diffraction
C) Both "A" & "B"
D) None of these

Q.25 **A student bought two identical lamps with same colour of bulbs and allowed to fall light of both lamps after passing through two narrow openings at screen but found no interference pattern, this is due to the reason that:**

A) Rays were not monochromatic
B) Rays were coherent
C) Rays were monochromatic
D) Rays were not coherent

Q.26 **In YDSE the centre is always a maxima, it's order is:**

A) 1st order
B) 2nd order
C) 0th order
D) None of these

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Q.27 **As we know that relation for distance of any minima from centre is written as $y_m = \left(m + \frac{1}{2}\right)\frac{\lambda L}{d}$. To find the closest minima to centre we:**

A) Put m=0, Call it zeroth order minima

B) Put m=1, Call it 1st order minima

C) Put m=0, Call it 1st order minima

D) None of these

Q.28 **If in YDSE four fringes are observed above the centre then total number of fringes present on screen will be:**

A) 4

C) 5

B) 9

D) Can't be predicted

Q.29 **If instead of monochromatic light one uses white light in YDSE then:**

A) No interference pattern will be observed

B) Centre will be white and coloured fringes will be observed on both sides

C) Same results will be observed as with monochromatic light

D) All of these

Q.30 **If we use white light in YDSE then the coloured fringe closer to the central maxima will be:**

A) Red

C) Blue

B) Green

D) Yellow

Q.31 **A light wave has intensity I_o at 2 cm distance from source, what would be intensity at 4 cm?**

A) Increase by factor 2

C) Increase by factor 3

B) Decrease by factor $\frac{1}{2}$

D) Decrease by factor $\frac{1}{4}$

Q.32 **The nature of light wave is explained by which of the following statement:**

A) Both electric field & magnetic field are transverse and perpendicular to each other

B) Electric field is transverse & magnetic field is longitudinal

C) Electric field is longitudinal & magnetic field is transverse

D) Both are longitudinal to each other

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Q.33 Types of optical fiber are:

A) Single mode step index fibre
B) Multimode step index fibre
C) Multimode graded index fibre
D) All of these

Q.34 For glass – air boundary, the value of critical angle θc is:

A) 41.5°
B) 41°
C) 41.8°
D) 41.2°

Q.35 Fiber optic communication system consists of:

A) Two components
B) Three components
C) Five components
D) Four components

Q.36 Multimode step index fiber is useful for:

A) Long distance
B) Short distance
C) Neither long nor short
D) None of these

Q.37 The diameter of multimode step index fiber core is:

A) 10 μm
B) 50 μm
C) 100 μm
D) 20 μm

Q.38 Multimode graded index fiber core has diameter of ranges:

A) 50 – 1500 μm
B) 50 – 3000 μm
C) 50 – 1000 μm
D) 50 – 2000 μm

Q.39 How many TV channels can be carried by single mode step index fiber:

A) 10
B) 14
C) 12
D) 16

Q.40 The optical fiber is covered for protection by a:

A) Glass jacket
B) Plastic jacket
C) Copper jacket
D) Rubber jacket

Q.41 The light emitted from LED used in optical fiber communication has a wave length:

A) 1.3 μm
B) 1.2 μm
C) 1.4 μm
D) 1.5 μm

Q.42 Digital modulation is expressed in:

A) Megabits
B) Bits
C) Terabits
D) Both A and B

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Q.43 **The light signals must be regenerated by a device which is called:**

A) Transmitter
B) Regenerator
C) Rectifier
D) Repeater

Q.44 **With a step index fiber the overall time difference may be about:**

A) 30 ns/km
B) 35 ns/km
C) 31 ns/km
D) 33 ns/km

Q.45 **Using a graded index fiber, the time difference is reduced to about:**

A) 15 ns/km
B) 33 ns/km
C) 1 ns/km
D) 50 ns/km

Q.46 **Total internal reflection can take place when light moves from:**

A) Glass to air boundary
B) Glass to water boundary
C) Air to glass boundary
D) Both "A" and "B"

Q.47 **The refractive index of a material is 1.5. The speed of light in this medium is:**

A) $1.5 \times 10^8\ ms^{-1}$
B) $1.5 \times 10^8\ ms^{-1}$
C) $2 \times 10^8\ ms^{-1}$
D) $3 \times 10^7\ ms^{-1}$

Q.48 **In mono-mode step index fibre which power loss is not possible?**

A) Dispersion
B) Scattering
C) Multiple reflection
D) All of these

Q.49 **Which of the following is relation for refractive index?**

A) $n = \frac{c}{v}$
B) $n = \frac{\text{Real depth}}{\text{Apparent depth}}$
C) $n = \frac{\lambda}{\lambda'}$
D) All of these

Q.50 **When light enters into a denser medium then?**

A) Speed decreases
B) Frequency remains same
C) Wavelength decreases
D) All of these

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ANSWER KEY (Worksheet-7)

1	D	11	D	21	C	31	D	41	A
2	D	12	D	22	C	32	A	42	D
3	D	13	C	23	C	33	D	43	D
4	B	14	D	24	A	34	C	44	D
5	D	15	A	25	D	35	B	45	C
6	B	16	A	26	C	36	B	46	D
7	D	17	B	27	C	37	B	47	C
8	B	18	B	28	B	38	C	48	A
9	C	19	D	29	B	39	B	49	D
10	B	20	C	30	C	40	B	50	D

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Worksheet-8

Topic:- KMT, Pressure of Gas, Interpretation of Temperature, Internal Energy, First Law of Thermodynamics, Specific Heat Capacity, Thermodynamic Scale of Temperature

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Q.1 **PV = RT Represent:**

A) Gas equation for n moles C) Both A and B

B) Gas equation for one mole D) None of these

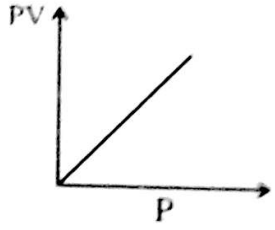
Q.2 **The value of Boltzman constant is:**

A) $13.8\times10^{-23}\ J/K$ C) $13.8\times10^{25}\ J/K$

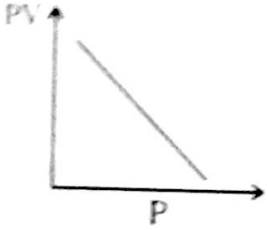
B) $1.38\times10^{-23}\ J/K$ D) None of these

Q.3 **In an experiment to investigate the relationship between the volume *V* of a fixed mass of an ideal gas and its pressure *P*, a graph of PV against P is plotted. Which graph shows the correct relationship at constant temperature?**

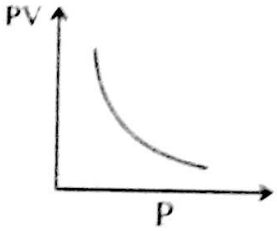
A)



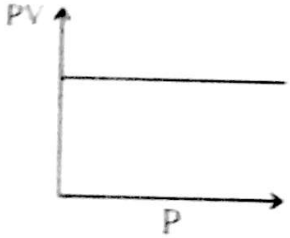
C)



B)



D)



Q.4 **Which of the following parameters does not characterize the thermodynamic state of matter?**

A) Work C) Temperature

B) Pressure D) Volume

Q.5 **The minimum number of thermodynamic parameters required to specify the state of gas system is/are:**

A) 1 C) 3

B) 2 D) ∞

Q.6 **During an adiabatic expansion the increase in volume is associated with:**

A) Decrease in pressure and decrease in temperature.

B) Increase in pressure and decrease in temperature.

C) Increase in pressure and increase in temperature.

D) Decrease in pressure and increase in temperature.

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Q.7 **In the expressions below, R is the molar gas constant, P is pressure, T is thermodynamic temperature, N_A is the Avogadro's number, n is the number of moles, k is the Boltzman constant, and m is the mass one molecule of gas. Which one of the expressions is correct for the molar volume V of an ideal gas?**

A) $\frac{RT}{P}$

B) $\frac{N_A RT}{P}$

C) $\frac{nRT}{P}$

D) $\frac{nkT}{P}$

Q.8 **The internal energy of 1 mole of an ideal gas depends on:**

A) Only volume

B) Only temperature

C) Only pressure

D) Temperature and pressure

Q.9 **The mass of O_2 molecules is 16 times that of H_2 molecules. The rms velocity of O_2 molecules at room temperature is C_{rms}. The rms velocity of H_2 molecules at the same temperature will be:**

A) 16 C_{rms}

B) 4 C_{rms}

C) $\frac{C_{rms}}{4}$

D) $\frac{C_{rms}}{16}$

Q.10 **The internal energy of a monoatomic ideal gas is:**

A) Translational K.E

B) Vibrational K.E

C) Rotational K.E

D) All of these

Q.11 **The rms velocity for monoatomic gas is:**

A) $\sqrt{\frac{3kT}{m}}$

B) $\sqrt{\frac{8kT}{\pi m}}$

C) $\sqrt{\frac{2kT}{m}}$

D) Zero

Q.12 **Internal energy is a unique function of state because change in internal energy.**

A) Does not depend upon path

B) Depends upon path

C) Corresponds to an adiabatic process

D) Corresponds to an isothermal process

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Q.13 **How will it effect the pressure "P" of a gas such that average velocity of gas molecules is doubled?**

A) $P' = 4P$
B) $P' = 2P$
C) $P' = P$
D) Not possible

Q.14 **When we provide heat to a system then it's temperature?**

A) May rise
B) May fall
C) May not change
D) Both A and C

Q.15 **For which of the following process work done comes out to be maximum?**

A) Isothermal
B) Isochoric
C) Adiabatic
D) Isobaric

Q.16 **When heat is neither given nor taken from a system then it's temperature?**

A) May remain same
B) May rise
C) May fall
D) All of these

Q.17 **If temperature is increased from 200 K to 800 K then what would be the change in pressure at constant volume?**

A) Increases by factor 4
B) Increases by factor 2
C) Decrease by factor 4
D) Decreases by factor 2

Q.18 **The correct relation for efficiency is:**

A) $\frac{T_1 - T_2}{T_2}$
B) $\frac{T_2 - T_1}{T_2}$
C) $\frac{T_1 - T_2}{T_1}$
D) $\frac{T_2 - T_1}{T_1}$

Q.19 **Triple point of water is:**

A) 273 K
B) 273.16 K
C) 273.15 K
D) All of these

Q.20 **For measurement of temperature of order of 400 °C we will prefer:**

A) Mercury thermometer
B) Alcohol thermometer
C) Radiation thermometer
D) Thermocouple

Q.21 **The direction of flow of heat between two bodies is determined by:**

A) Internal energy
B) Kinetic energy
C) Total energy
D) None of these

Q.22 **A Carnot engine can be 100% efficient practically if its sink is at:**

A) 0 K
B) 0° C
C) 0° F
D) Not possible

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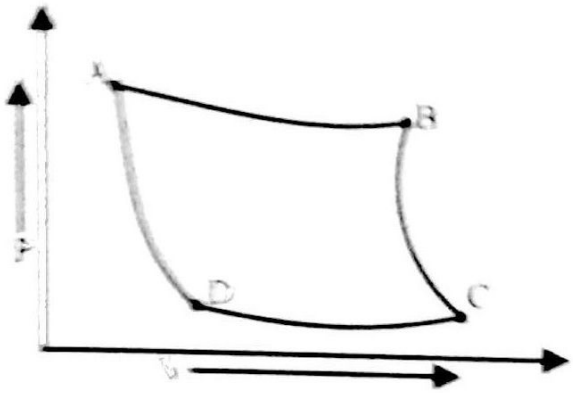
Q.23 Which of the following scales is independent of the working substance?

A) Celsius scale
B) Kelvin scale
C) Fahrenheit scale
D) All of above

Q.24 20°C will be equal to:

A) 50°F
B) 98°F
C) 68°F
D) 100°F

Q.25 Consider the graph of carnot cycle shown below:



Which curve represents isotherm?

A) AB, BC
B) CD, DA
C) AB, CD
D) AD, CB

Q.26 Considering graph of question 25, which curve shows no heat entering or leaving the system.

A) AB, CD
B) AD
C) BC
D) Both "B" and "C"

Q.27 Considering graph of question 25 which point or points represent temperature of hot body?

A) A, B
B) B, C
C) C, D
D) D, A

Q.28 Considering graph of question 25 which point or points represent temperature of cold body?

A) A, B
B) B, C
C) C, D
D) D, A

Q.29 During a Carnot cycle heat enters in the system then temperature of system must:

A) Rise
B) Fall
C) Remain same
D) May rise or fall

Q.30 During a Carnot cycle heat leaves the system then temperature of system must:

A) Rise
B) Fall
C) Remain same
D) May rise or fall

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Q.31 **During a Carnot cycle heat neither enters nor leave the system then the temperature of the system:**

A) May rise
C) Must not change
B) May fall
D) Must change

Q.32 **Carnot cycle consists of ____ processes.**

A) 2
C) 4
B) 3
D) 5

Q.33 **In Carnot cycle heat is added only during:**

A) Isothermal compression
B) Adiabatic compression
C) Isothermal expansion
D) Adiabatic expansion

Q.34 **In complete Carnot cycle:**

A) Work done is zero
B) Change in internal energy is zero
C) Net heat added is zero
D) All of these

Q.35 **Which is correct expression for efficiency of Carnot engine?**

A) $\eta = \left(\frac{t_1 - t_2}{t_1 + 273}\right)$
C) $\eta = \left(1 - \frac{t_2 + 273}{t_1 + 273}\right)$
B) $\eta = \left(\frac{W}{Q_1}\right)$
D) All of these

Q.36 **Efficiency of Carnot engine is:**

A) Directly proportional to source temperature
B) Inversely proportional to sink temperature
C) Directly proportional to difference of source & sink temperature
D) All of these

Q.37 **Efficiency of practical engines:**

A) Independent of nature of working substance
B) Dependent of nature of working substance
C) Dependent of source and sink temperature
D) Both "B" and "C"

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Q.38 **Evidence in favour of kinetic theory of gases is exhibited in:**

A) Diffusion of gases

B) Brownian motion of smoke particles

C) Both A & B

D) None of these

Q.39 **Kinetic theory of gases is based on:**

A) Microscopic approach

B) Macroscopic approach

C) Molecular approach

D) Both A and C

Q.40 **"Molecules do not exert force on each other" this postulate implies:**

A) Gas molecules do not have K.E

B) Gas molecules have P.E

C) Gas molecules have very small mass

D) Gas molecules do not have P.E

Q.41 **The momentum transferred to the walls of the container per second per unit area due to continuous collisions of molecules of the gas gives:**

A) Force per unit area

B) K.E of gas

C) Pressure of gas

D) Both A and C

Q.42 **The collision frequency of gas molecules in a cubical container is:**

A) $\frac{2\ell}{v}$

B) $\frac{2\ell}{3v}$

C) $\frac{3v}{2\ell}$

D) $\frac{v}{2\ell}$

Q.43 **If there are "N" no. of molecules each of mass "m" in a cubical container of volume "ℓ^3", then density of gas is given by:**

A) $\frac{m}{\ell^3}$

B) $\frac{M}{\ell^3}$

C) $\frac{m}{N\ell^3}$

D) $\frac{mN}{\ell^3}$

Q.44 **Referring to Q.43, the no. of particles colliding with any face of cube are:**

A) $\frac{N}{3}$

B) $\frac{N}{2}$

C) $\frac{N}{6}$

D) $\frac{N}{4}$

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Q.45 **A gas in a cubical container contains three molecules each having speed of 2 m s^{-1}, 4 m s^{-1} and 4 m s^{-1}. What is the root mean square speed?**

A) $\frac{36}{3}\ m\ s^{-1}$

B) $12\ m\ s^{-1}$

C) $6\ m\ s^{-1}$

D) $\sqrt{12}\ m\ s^{-1}$

Q.46 **Two gases A and B having the same temperature T, same pressure P, and same volume V are mixed, If the mixture is at the same temperature and occupies a volume V, the pressure of the mixture is:**

A) P

B) 4P

C) 2P

D) 6P

Q.47 **If P is the pressure of the gas, then the kinetic energy per unit volume of the gas is:**

A) P/2

B) (3/2)P

C) P

D) 2P

Q.48 **H_2 and O_2 both are at thermal equilibrium at 600 K. Oxygen is 16 times heavier than H_2. Root mean square speed of Hydrogen is:**

A) 4 times the root mean square speed of O_2

B) $^1/_{16}$ times the root mean square speed of O_2

C) $^1/_4$ times the root mean square speed of O_2

D) 16 times the root mean square speed of O_2

Q.49 **The r.m.s speed of gas molecules having molar mass 'M' at a temperature 'T' is proportional to:**

A) $\sqrt{M}$

B) $\frac{1}{M}$

C) $\frac{1}{\sqrt{M}}$

D) None of these

Q.50 **The pressure of gas is directly proportional to**

A) Mean velocity of the molecules

B) Root mean square velocity of the molecules

C) Velocities of individual molecule

D) Mean square velocity of the molecules

Q.51 **The temperature of a gas is 0°C. Its root mean square velocity will be doubled at:**

A) 273°C

B) 819°C

C) 1092°C

D) 103°C

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Q.52 The r.m.s velocity of the molecules of an ideal gas at S.T.P is 'v'. The gas is heated at constant volume till the pressure becomes double. The final r.m.s velocity is

A) v
C) $\sqrt{2}v$
B) 2v
D) $\frac{v}{2}$

Q.53 The mean square velocity of the molecules of an ideal gas at S.T.P is 'v'. The gas is heated at constant volume till the pressure becomes double. The final mean square velocity is:

A) v
C) $\sqrt{2}v$
B) 2v
D) $\frac{v}{2}$

Q.54 The temperature of a gas is increased from 27° C to 127° C. The ratio of mean K.E at initial to final temperature is:

A) $\frac{10}{9}$
C) $\frac{4}{3}$
B) $\frac{3}{4}$
D) $\frac{9}{16}$

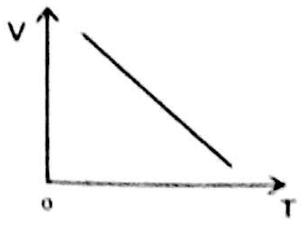
Q.55 The mean kinetic energy of gas molecules at t° C is directly proportional to:

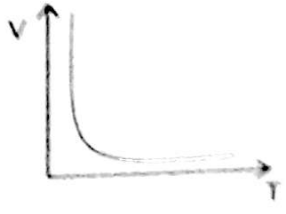
A) $\sqrt{t}$
C) $\sqrt{t+273}$
B) $(t+273)$
D) t

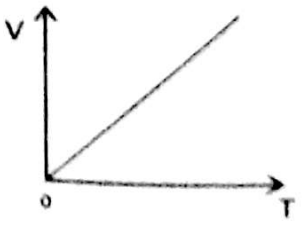
Q.56 The density of gas A is four times that of gas B. If the molar mass of gas A is M, then molar mass of gas B is:

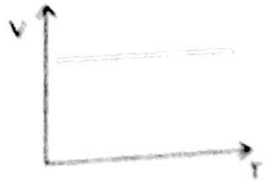
A) 2M
C) 4M
B) $\frac{M}{4}$
D) $\frac{M}{2}$

Q.57 Which one of the following represents correctly the variation of the volume (V) of an ideal gas with temperature (T) under constant pressure conditions?

A)


C)


B)


D)


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Q.58 **Which one is correct relation between "°F" and "°C"?**

A) $^{\circ}F = \frac{9}{5}{}^{\circ}C + 32$

B) $^{\circ}C = (^{\circ}F - 32)\frac{5}{9}$

C) $^{\circ}F = \frac{9}{5}(^{\circ}C + 32)$

D) Both A and B

Q.59 **The temperature at which "°C" and "°F" have same values:**

A) +40°

B) 160°

C) -40°

D) -160°

Q.60 **The temperature at which "°F" and "Kelvin" have same values:**

A) 460

B) 574

C) 340

D) 525

Q.61 **At constant temperature if the pressure of gas is doubled then its volume becomes:**

A) Half

B) Double

C) Remains same

D) Four times

Q.62 **In the general gas equation $PV = nRT$, how many state variable are there?**

A) 2

B) 3

C) 4

D) 5

Q.63 **Which one of following is not true about the ratio "$\frac{R}{N_A}$"?**

A) It is called Boltzmann constant

B) It is called gas constant per mole

C) It is called gas constant per molecule

D) None of these

Q.64 **Which one of following is true about ideal gas?**

A) Mean K.E is directly proportional to absolute temperature

B) Average speed of gas molecules is not zero

C) Average velocity of gas molecules is zero

D) All of these

Q.65 **The average speed of oxygen at STP is:**

A) 473 m s^{-1}

B) 493 m s^{-1}

C) 437 m s^{-1}

D) 461 m s^{-1}

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Q.66 **Which of following expression is not true?**

A) $v_{rms} = \sqrt{\frac{3RT}{M}}$

B) $v_{rms} = \sqrt{\frac{3kT}{m}}$

C) $v_{rms} = \sqrt{\frac{3RT}{N_A m}}$

D) None of these

Q.67 **Which one is true expression of mean K.E of a molecule of ideal gas?**

A) $\frac{3P}{2N_0}$

B) $\frac{3PV}{2N}$

C) $\frac{3kT}{2}$

D) All of these

Q.68 **Which of following is correct about internal energy of ideal gas?**

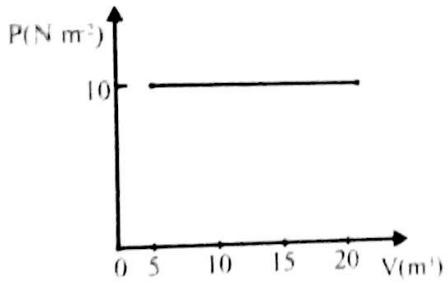
A) It is measure of average translational K.E

B) It is directly proportional to absolute temperature

C) It is a state function

D) All of these

Q.69 **The work done during following expansion of:**



A) 150 J

B) 100 J

C) 75 J

D) 200 J

Q.70 **First law of thermodynamics is restatement of conservation of:**

A) Energy

B) Momentum

C) Charge

D) Mass

Q.71 **Which is correct expression of 1st law of thermodynamics for bicycle pump?**

A) $Q=\Delta U+W$

B) $Q-\Delta U=W$

C) $-W=+\Delta U$

D) $\Delta U=Q-W$

Q.72 **Which is correct expression of 1st law of thermodynamics for Human metabolism?**

A) $\Delta U=Q-W$

B) $-\Delta U=+W$

C) $+\Delta U=-W$

D) None of these

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Q.73 **The process that occurs at constant temperature is:**

A) Isothermal process
B) Adiabatic process
C) Isochoric process
D) Isobaric process

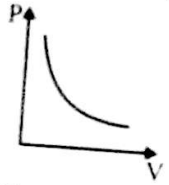
Q.74 **The PV-equation for isothermal process is:**

A) $P_1V_1 = P_2V_2$
B) $P_1V_1^{\gamma} = P_2V_2^{\gamma}$
C) $P = constt$
D) $V = constt$

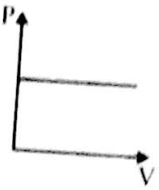
Q.75 **1st law of thermodynamics in case of Adiabatic process is:**

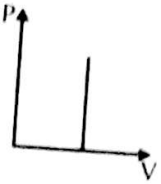
A) $W = -\Delta U$
B) $Q = W - \Delta U$
C) $-Q = +W - \Delta U$
D) $Q - \Delta U = W$

Q.76 **Which one represent Adiabat?**

A) 

B)

C) 

D) 

Q.77 **The ratio of slope of Adiabat to Isotherm is:**

A) γ
B) γ^2
C) $\frac{1}{\gamma}$
D) $\frac{1}{\gamma^2}$

Q.78 **During which process work done is minimum?**

A) Isothermal
B) Isochoric
C) Adiabatic
D) Isobaric

Q.79 **Which is correct expression?**

A) $C_P - C_V = R, \frac{C_P}{C_V} = \gamma$
B) $C_P = \frac{\gamma R}{(\gamma - 1)}$
C) $C_V = \frac{R}{(\gamma - 1)}$
D) All of these

Q.80 **1st law of thermodynamics in case of Isobaric process is:**

A) $C_P\Delta T = P\Delta V$
B) $C_V\Delta T = C_P\Delta T + P\Delta V$
C) $C_P\Delta T = C_V\Delta T + P\Delta V$
D) None of these

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ANSWER KEY (Worksheet-8)

1	B	21	D	41	D	61	A
2	B	22	D	42	D	62	B
3	D	23	B	43	D	63	B
4	A	24	C	44	C	64	D
5	B	25	C	45	D	65	D
6	A	26	D	46	C	66	D
7	A	27	A	47	B	67	D
8	B	28	C	48	A	68	D
9	B	29	C	49	C	69	A
10	A	30	C	50	D	70	A
11	A	31	D	51	B	71	C
12	A	32	C	52	C	72	A
13	D	33	C	53	B	73	A
14	D	34	B	54	B	74	A
15	D	35	D	55	B	75	A
16	D	36	D	56	B	76	B
17	A	37	D	57	B	77	A
18	C	38	C	58	D	78	B
19	B	39	D	59	C	79	D
20	D	40	D	60	B	80	C

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Worksheet-9

Topic:- Deformation of Solids

Q.1 **The amount of strain energy stored in deformed stretched wire is equal to:**

A) $\frac{1}{2}\left[\frac{EAl_1^2}{L}\right]$

B) $\frac{1}{2}\left[EAl_1\right]^3$

C) $\frac{1}{2}\left[\frac{EAl_1}{2}\right]$

D) $\left[\frac{EAl_1}{2}\right]$

Q.2 **Glass and high carbon steel are examples of:**

A) Hard substances

B) Ductile substances

C) Brittle substances

D) None of these

Q.3 **Substance which break just after the elastic limit is reached, are called:**

A) Brittle substances

B) Hard substances

C) Soft substances

D) None of these

Q.4 **The dimension of strain is:**

A) $\left[LT^{-1}\right]$

B) [M]

C) [L]

D) Dimension less

Q.5 **The substances which undergo plastic deformation until they break are called:**

A) Soft

B) Ductile

C) Brittle

D) None of these

Q.6 **The value of stress beyond which the body is permanently deformed is called:**

A) Yield stress

B) Minimum stress

C) Plastic stress

D) None of these

Q.7 **If stress is increased beyond the elastic limit of the material, it becomes permanently changed this behavior is called:**

A) Plasticity

B) Elasticity

C) Yield strength

D) Rigidity

Q.8 **Stress is directly proportional to strain within the elastic limit is:**

A) Newton's law

B) Lenz's law

C) Hook's law

D) Faraday's law

Q.9 **S.I unit of modulus of elasticity is/are:**

A) Pascal

B) Newton

C) Ampere

D) Volt

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Q.10 Temporary deformation is called:

A) Elastic deformation
B) Plastic deformation
C) Yield strength
D) None of these

Q.11 Beyond ultimate tensile stress the stress at which material breaks is called:

A) Fracture stress
B) Tensile stress
C) Volumetric stress
D) Rigidity

Q.12 The units of elastic limit are of:

A) Energy density
B) Young's modulus
C) Both "A" and "B"
D) No units

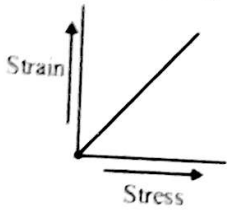
Q.13 The area under stress-strain graph provides _____ stored in deformed object:

A) Energy
B) Energy density
C) Modulus of rigidity
D) Both "A" and "B"

Q.14 The modulus of elasticity depends upon:

A) Nature of material
B) Temperature
C) Both "A" and "B"
D) Area of cross section

Q.15 The slope of the following graph provides:



A) Modulus of elasticity
B) Compressibility
C) Both "A" and "B"
D) None of these

Q.16 The units of proportional limit are:

A) $N\ m^{-2}$
B) Pascal
C) Both "A" and "B"
D) No units

Q.17 What is the relation between stress σ and modulus of elasticity (Y) if length of a wire under stress is doubled?

A) $\sigma > Y$
B) $\sigma < Y$
C) $\sigma = Y$
D) None of these

Q.18 The stress has same units as that of:

A) Pressure
B) Energy density
C) Bulk modulus
D) All of these

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Q.19 A wire of radius "r", breaking force Fo and breaking stress (σu) is stretched such that its radius becomes half, the new breaking force and stress will be

A) F_o, σ_u

B) $\frac{F_o}{4}, \sigma_u$

Q.20 A wire breaks if a load of "W" is suspended with it. Now if it is cut into two equal parts these parts will break if a load of _____ is suspended.

A) $\frac{W}{2}$

B) W

Q.21 The breaking stress depends on

A) Material of wire

B) Area of cross section of wire

C) Length of wire

D) Diameter of wire

Q.22 Compressive stress is given by

A) $\frac{F}{\ell}$

B) F/A

Q.23 The breaking force of a wire depends on

A) Material of wire

B) Area of cross section of wire

C) Change in length of wire when stress is applied

D) All of these

Q.24 The ratio of tensile stress to volume stress has dimensions same as that of:

A) Area

B) Length

Q.25 A wire is stretched so that its length becomes double of initial length. The strain produced is:

A) 2

B) $\frac{1}{2}$

C) 1

D) 4

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Q.26 **A load "W" is suspended with a wire causes an extension of "$\Delta\ell$" in the length of wire. Now if the wire is cut into two equal parts & same load is suspended with each part, the extension caused in each part will be:**

A) $\Delta\ell$

B) $2\Delta\ell$

C) $\frac{\Delta\ell}{2}$

C) $\frac{\Delta\ell}{4}$

Q.27 **If a stress changes the shape of a crystal by 45°, the strain occurred will be :**

A) $\frac{1}{\sqrt{2}}$

B) 1

C) $\sqrt{2}$

D) $\frac{1}{2}$

Q.28 **If the temperature of a copper wire is increased, its modulus of elasticity _____.**

A) Increases

B) Remains same

C) Decreases

D) Becomes infinity

Q.29 **The ratio of compressive stress to compressive strain is called _____.**

A) Young's Modulus

B) Shear Modulus

C) Bulk Modulus

D) Modulus of rigidity

Q.30 **The extension occurred in a wire depends on (For same applied force):**

A) Initial length of wire

B) Area of cross section of wire

C) Material of wire

D) All of these

Q.31 **To cause greater extension a wire should be:**

A) Thin and short

B) Thin and long

C) Thick and long

D) Thick and short

Q.32 **Young's Modulus is also named as:**

A) Modulus of rigidity

B) Shear modulus

C) Bulk modulus

D) Tensile modulus

Q.33 **The reciprocal of bulk modulus is called:**

A) Stiffness

B) Toughness

C) Hardness

D) Compressibility

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Q.34 **Shear modulus and Young's modulus for water are:**

A) Undefined
C) Zero
B) $2.2\times10^{9}\ Nm^{-2}$
D) None of these

Q.35 **Modulus of rigidity is another name for:**

A) Young's modulus
C) Bulk modulus
B) Shear modulus
D) None of these

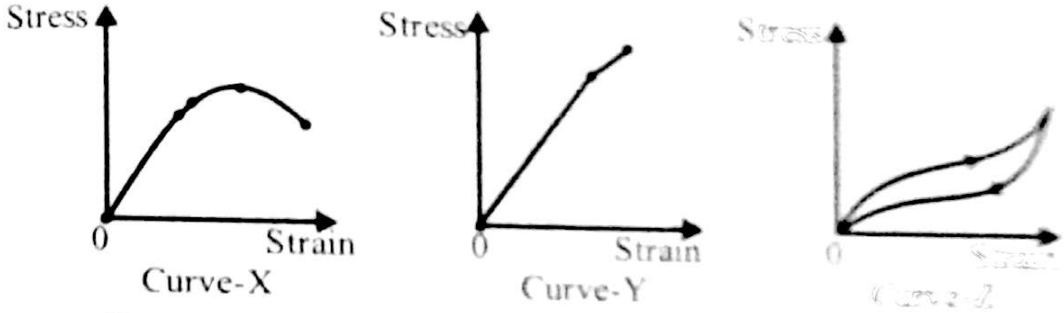
Q.36 **Modulus of elasticity for a perfect elastic rigid body is:**

A) Zero
C) Very large
B) Very small
D) Infinite

Q.37 **Which of following is more elastic?**

A) Rubber
C) Glass
B) Steel
D) Lead

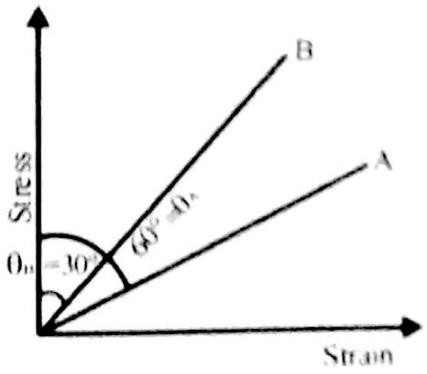
Q.38 **Three stress-strain graph are shown as:**



Curve X, Y & Z represent which substance respectively?

A) Brittle, ductile, rubber
B) Rubber, brittle, ductile
C) Ductile, brittle, rubber
D) None of these

Q.39 **The stress-strain graphs for two wires of A and B are shown as:**



$\frac{Y_A}{Y_B} =$ _____ ?

A) 1:3
C) 3:1
B) $\sqrt{3}:1$
D) $1:\sqrt{3}$

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Q.40 **The slope of graph between strain and stress taking strain on y-axis and stress on x-axis represents?**

A) Elastic modulus

B) Energy density

C) Tensile stress

D) Reciprocal of elastic modulus

Q.41 **In a tensile test a wire is stretched such that its radius becomes half of present value when the load suspended is doubled If the initial value of Young's Modulus is "Y", then new value of Modulus will be:**

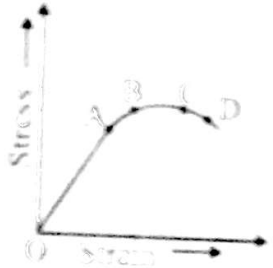
A) 2Y

B) 4Y

C) $\frac{Y}{2}$

D) Y

Q.42 **In the following curve for a ductile substance the plasticity behavior is from:**



A) O to A

B) O to C

C) O to B

D) B to C

Q.43 **Referring to graph shown in Question 42, Hook's law is obeyed from:**

A) O to A

B) O to C

C) O to B

D) B to C

Q.44 **Referring to graph shown in Question 42, the elasticity region is from:**

A) O to A

B) O to C

C) O to B

D) B to C

Q.45 **A stress of 200 x 10^5 Pa is applied on a 2 m long rod through a mass of 5000 Kg. If the linear strain of the rod is 10^{-4} m, the Young's modulus Y is:**

A) 1.5 x 10^{-4} Pa

B) 2 x 10^5 Pa

C) 1.5 x 10^4 Pa

D) 200 x 10^9 Pa

Q.46 **An iron cube of length 1 m is acted upon by a tangential force of 10^5 N due to which the upper face the cube is displaced by 0.02 cm w.r.t the bottom face. Then the shearing stress of the cube will be:**

A) 0.02 Pa

B) 0.02 x 10^5 Pa

C) 10^5 Pa

D) 3 x 10^5 Pa

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Q.47 **Referring to data in Question 46, what will be the shearing strain?**

A) 0.02 C) 10^5

B) 0.02×10^{-2} D) 2×10^5

Q.48 **A certain force increases the length of a wire by 1 mm which of the following is required to increase the length by 2 mm:**

A) 2F C) 4F

B) 8F D) 16F

Q.49 **Steel has greater modulus of elasticity than rubber thus for larger strain in rubber it requires stress:**

A) Less as compared to steel

B) Larger as compared to steel

C) Equal as compared to steel

D) Very high as compared to steel

Q.50 **A steel wire 12 mm in diameter is stretched by a force of 36π N, the tensile stress will be:**

A) 2 MPa C) 1 MPa

B) 0.5 μPa D) None of these

Q.51 **A steel wire is loaded by 2 Kg, if the radius of the wire is halved uniformly, then length becomes:**

A) Double C) Half

B) Four times D) Remains same

Q.52 **There are two wires A and B of same material and same length while the diameter of wire B is 2 times the diameter of wire A. Then ratio of the extensions produced in the wires by applying the same force will be**

A) 1:1 C) 2:1

B) 3:1 D) None of these

Q.53 **Two wires of the same material and radius but having lengths in the ratio 1:2 are stretched with the same force. The ratio of the work done in the two cases will be:**

A) 1:1 C) 1:2

B) 1:4 D) None of these

Q.54 **If a substance can undergo elastic deformation until it breaks, it is:**

A) Brittle substance C) Ductile substance

B) Crystalline substance D) Poly meric substance

Q.55 **If stress is applied on a body then ratio of change in volume to original volume will be:**

A) Polymeric strain C) Volumetric strain

B) Parallel strain D) Tensile strain

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ANSWER KEY (Worksheet-9)

1	A	21	A	41	D
2	C	22	D	42	D
3	A	23	D	43	A
4	D	24	D	44	C
5	B	25	C	45	D
6	A	26	C	46	C
7	A	27	B	47	B
8	C	28	C	48	A
9	A	29	A	49	A
10	A	30	D	50	C
11	A	31	B	51	B
12	C	32	D	52	D
13	B	33	D	53	C
14	C	34	C	54	A
15	B	35	B	55	C
16	C	36	D		
17	C	37	B		
18	D	38	C		
19	B	39	A		
20	B	40	D		

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Worksheet-10

Topic:- Magnetic Flux, Faraday's Law, Lenz's Law, Transformer, Alternating Current, Peak and RMS Value of AC

Q.1 The value of induced e.m.f in a coil of "N" number of turns depends upon:

A) Strength of magnetic field

B) Speed at which magnet is moved towards or away from coil

C) No. of turns of coil

D) All of these

Q.2 A bar magnet of magnetic field 2 T is made to move towards a coil having a galvanometer with a speed of 4 ms^{-1} such that galvanometer shows a deflection "θ_1". Now if the same bar magnet is made to move away from same coil with same speed and galvanometer shows deflection "θ_2" then what is true?

A) $\theta_1=\theta_2$ and both deflections are in same direction

B) $\theta_1<\theta_2$ and both deflections are in same direction

C) $\theta_1>\theta_2$ and both deflections are is opposite directions

D) $\theta_1=\theta_2$ but both deflections are in opposite direction

Q.3 With reference to the Q.2 if only $\vec{B}$ is doubled and bar is only made to move towards coil with a speed of 4 ms^{-1} then:

A) Induced e.m.f becomes half

B) Induced e.m.f remains same

C) Induced e.m.f is doubled

D) None of these

Q.4 With reference to the Q.2 if both $\vec{B}$ and speed of bar magnet are doubled then:

A) Induced e.m.f becomes quadrupled

B) Induced e.m.f remains same

C) Induced e.m.f is doubled

D) None of these

Q.5 With reference to Q.2 if only number of turns of coil are doubled then:

A) Induced e.m.f becomes half

B) Induced e.m.f remains same

C) Induced e.m.f is doubled

D) None of these

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Q.6 **The relation for motional e.m.f can be written as:**

A) $\varepsilon = -vBL\cos\theta$

B) $\varepsilon = -vBL\sin\theta$

C) $\varepsilon = +vBL\sin\theta$

D) $\varepsilon = -vBL$

Q.7 **If a conductor is moved across a $\vec{B}$ such that θ=90° then induced emf:**

A) Is a maximum

B) Is zero

C) $\varepsilon = -vBL$

D) Both "A" and "C"

Q.8 **At what angle when a rod is moved in a uniform $\vec{B}$ such that induced emf becomes half of it's maximum?**

A) 30°

B) 45°

C) 60°

D) 90°

Q.9 **According to lenz's law the direction of induced current is such that it:**

A) Decreases flux if it is increasing

B) Opposes the cause which produces it

C) Increases flux if it is decreasing

D) All of these

Q.10 **The cause of induced emf is:**

A) Rate of change of magnetic flux

B) Decrease in flux

C) Increase in flux

D) Change in flux

Q.11 **If we take away north-pole of a bar magnet from a coil then the end of coil facing north-pole act as:**

A) A north pole

B) A south pole

C) May be north or south

D) No pole will be induced

Q.12 **Which of the following is true about dependence upon resistance of the coil in which e.m.f is generated?**

A) Only induced current depends upon resistance of coil

B) Only emf depends upon resistance of coil

C) Both emf and induced current depends upon resistance of coil

D) Can't be predicted

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Q.13 **A bar magnet as shown in figure is allowed to fall down into a coil having a cut. What is true?**

A) emf will be induced only

B) Neither emf nor current will be induced

C) Both emf and current will be induced

D) None of these

Q.14 **Considering the statement of Q.13 what is true about the acceleration of bar magnet while coming down?**

A) $a=g$ C) $a<g$

B) $a<g$ D) $a=0$

Q.15 **Considering the figure of Q.13 if the coil is complete and does not have cut in it then:**

A) Only emf will be induced

B) Only current will be induced

C) Both emf and current will be induced in it

D) Nothing will be induced

Q.16 **Considering the statement of Q.15 what is true about the acceleration produced in the bar magnet while falling downwards?**

A) $a=g$ C) $a<g$

B) $a>g$ D) $a=0$

Q.17 **Under which of the following conditions even when both area of coil and $\vec{B}$ in the region are continuously changing yet there is no emf induced?**

A) If $A \propto \frac{1}{B}$

B) If flux remains zero

C) If coil is placed parallel to $\vec{B}$

D) All of these

Q.18 **The working principle of a transformer is:**

A) Motional emf

B) Self induction

C) Mutual induction

D) Farday's law of electromagnetic induction

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Q.19 **The basic objective of a transformer is:**

A) To increase A.C voltage

B) To alter A.C voltage

C) To decrease A.C voltage

D) To alter D.C voltage

Q.20 **The relation for e.m.f produced by an A.C generator is:**

A) $\varepsilon = \varepsilon_0 \sin\theta$

B) $\varepsilon = N\omega AB\sin\theta$

C) Both "A" and "B"

D) None of these

Q.21 **The maximum e.m.f induced by an A.C generator which has only one turn is:**

A) $N\omega AB$

B) NAB

C) ωAB

D) None of these

Q.22 **A step-up transformer is the one which:**

A) Increases voltage level

B) Decreases current level

C) Keeps power level

D) All of these

Q.23 **A step-down transformer is the one which:**

A) Decreases voltage level

B) Keeps power level

C) Increases current level

D) All of these

Q.24 **The turn ratio of transformer is:**

A) $\frac{N_s}{N_p}$

B) $\frac{N_p}{N_s}$

C) Both A and B

D) None of these

Q.25 **An ideal step down transformer is connected to main supply of 240 V. It is desired to operate a 12 V, 30 W lamp. What is the current in the primary?**

A) 0.125 A

B) 0.25 A

C) 0.5 A

D) 0.75 A

Q.26 **Referring to Q.25, what is the transformation ratio:**

A) 10

B) $\frac{1}{20}$

C) 20

D) $\frac{1}{10}$

Q.27 **Magnetic flux passing through a surface area will be half of maximum value when:**

A) $\vec{A}$ makes 60° with $\vec{B}$

B) $\vec{A}$ makes 30° with $\vec{B}$

C) $\vec{A}$ makes 45° with $\vec{B}$

D) $\vec{A}$ makes 0° with $\vec{B}$

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Q.28 **Magnetic flux passing through a surface area will be $\frac{\sqrt{3}}{2}$ times the maximum flux if plane area makes _____ angle with magnetic field.**

A) 30°
C) 60°
B) 45°
D) 75°

Q.29 **The basic difference between A.C and D.C is:**

A) Direction reversal by A.C
B) Changing magnitude by A.C
C) Both A and B
D) None of these

Q.30 **An A.C current is given by I=100 sin100πt. It will achieve value of 50 A after _____ second.**

A) $\frac{1}{600}$
C) $\frac{1}{300}$
B) $\frac{1}{1800}$
D) $\frac{1}{900}$

Q.31 **A bulb is connected with A.C supply. The intensity of light from the bulb:**

A) Changes continuously
B) Decreases and becomes zero
C) Increases and reaches to its maximum
D) Remains constant

Q.32 **Two A.Cs are represented by $I_1 = 100 sin 100\pi t$ and $I_2 = 100 sin 200\pi$, the relation between the frequencies of these A.Cs is:**

A) $f_1 = f_2$
C) $f_2 = 2f_1$
B) $f_1 = 2f_2$
D) $f_1 = 10f_2$

Q.33 **The time taken by A.C to reach half of maximum value is _____ while initial phase of A.C is 0°.**

A) $\frac{T}{8}$
C) $\frac{T}{12}$
B) $\frac{T}{6}$
D) $\frac{T}{4}$

Q.34 **How many times A.C achieves zero value in one cycle:**

A) Once
C) Thrice
B) Twice
D) Four times

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Q.35 **The rms value of A.C in 1st half is:**

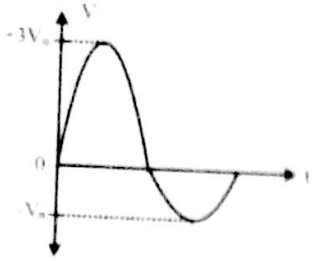
A) Zero

C) $\frac{I_o}{\sqrt{2}}$

B) $\frac{I_o}{2}$

D) $\frac{2I_o}{\sqrt{2}}$

Q.36 **In the following waveform, the peak to peak value is:**



A) $+2V_o$

C) $+1V_o$

B) $+3V_o$

D) $+4V_o$

Q.37 **Referring to questions # 8, the rms value will be:**

A) $\frac{V_o}{\sqrt{2}}$

C) $\sqrt{\frac{3}{2}}V_o$

B) $\sqrt{\frac{2}{5}}V_o$

D) $\sqrt{\frac{5}{2}}V_o$

Q.38 **The rate of heat production in a resistor due to an alternating current of rms value 10A is same as that due to a direct current of:**

A) 10 A

C) $10\sqrt{3}\ A$

B) $10\sqrt{2}\ A$

D) 5 A

Q.39 **The voltage of domestic A.C is 220 volt what does this represent:**

A) Mean voltage

B) Peak voltage

C) Root mean voltage

D) Root mean square voltage

Q.40 **Mostly voltmeters read _____ value of A.C voltage:**

A) Mean voltage

B) Peak voltage

C) Root mean voltage

D) Root mean square voltage

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ANSWER KEY (Worksheet-10)

1	D	11	B	21	C	31	A
2	D	12	A	22	D	32	C
3	C	13	A	23	D	33	C
4	A	14	A	24	A	34	B
5	C	15	C	25	A	35	C
6	B	16	C	26	B	36	D
7	D	17	D	27	A	37	D
8	A	18	C	28	C	38	A
9	D	19	B	29	A	39	D
10	D	20	C	30	A	40	D

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Topic:- Half and Full Wave Rectification, Operational Amplifier and its Characteristics, OP-AMP as Inverting and Non-inverting Amplifiers

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Q.1 A P-N junction diode is said to be forward biased when:

A) No potential difference is applied across P and N regions

B) A potential difference is applied across P and N regions making P region positive and N region negative

C) A potential difference is applied across P and N regions making P region negative and N region positive

D) A magnetic field is applied in the region of junction

Q.2 When a P-N junction is forward biased then width of depletion region.

A) Increases
B) Decreases
C) Remains unchanged
D) is variable

Q.3 Circuit used to convert pulsating DC into pure DC is called:

A) Rectifier
B) Inverter
C) Filter
D) Converter

Q.4 A diode characteristics curve is a plot between:

A) Voltage and time
B) Current and time
C) Voltage and current
D) All of these

Q.5 When a diode is reverse biased, then its resistance is of the order of?

A) ohms
B) kilo ohms
C) mega ohms
D) micro ohms

Q.6 Which device can used as a rectifier?

A) Resistor
B) Op-Amp
C) Gate
D) Diode

Q.7 Seven segment display is made of.

A) LED
B) Photodiode
C) Transistors
D) Photovoltaic cell

Q.8 Which diode is used for detection of light?

A) LED
B) Photodiode
C) Transistors
D) Photovoltaic cell

Q.9 If a diode is reverse biased, then width of depletion region _____ and potential barrier _____.

A) Increase, Decrease
B) Decrease, Increases
C) Decrease, Decreases
D) Increase, Increases

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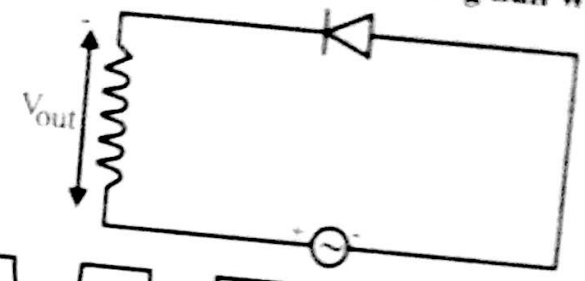
Q.10 **What can be the output of following half wave rectifier?**



A)

C)

B)

D)

Q.11 **When a photo-voltaic cell is connected across a resistor and exposed to light, its P-terminal behaves as _____ and N-terminal behaves as_____.**

A) Positive, Negative
B) Negative, Positive
C) Positive, Positive
D) Negative, Negative

Q.12 **The number of input terminals of an ordinary op-amp are:**

A) Two
B) Three
C) Four
D) Eight

Q.13 **The magnitude of "Open loop gain" of an amplifier is of the order of:**

A) $10^5\ \Omega$
B) 10^5 A
C) 10^5 V
D) 10^5

Q.14 **An op-amp can be used as a:**

A) Inverting and non-inverting amplifier
B) Comparator
C) Night switch
D) All of the above

Q.15 **The Closed loop Gain "G" of the non-inverting amplifier can be expressed by:**

A) $G = \frac{-R_2}{R_1}$
B) $G = 1 + \frac{R_2}{R_1}$
C) $G = \frac{R_2}{R_1}$
D) $G = 1 - \frac{R_1}{R_2}$

Q.16 **An op-amp will act as an inverting amplifier when the input signal is not connected to:**

A) Non-inverting terminal
B) Inverting terminal
C) Non-Inverting output
D) Inverting output

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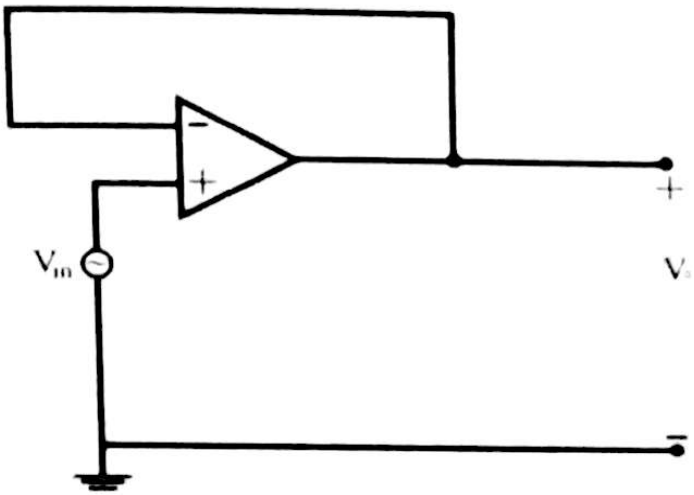
Q.17 **An op-amp will not act as a non-inverting amplifier when input signal is connected to the**

A) Non-inverting input
C) Non-Inverting output
B) Inverting input
D) Inverting out put

Q.18 **The gain of an inverting amplifier having external resistance R_1=50 kΩ and R_2=200 kΩ respectively will be**

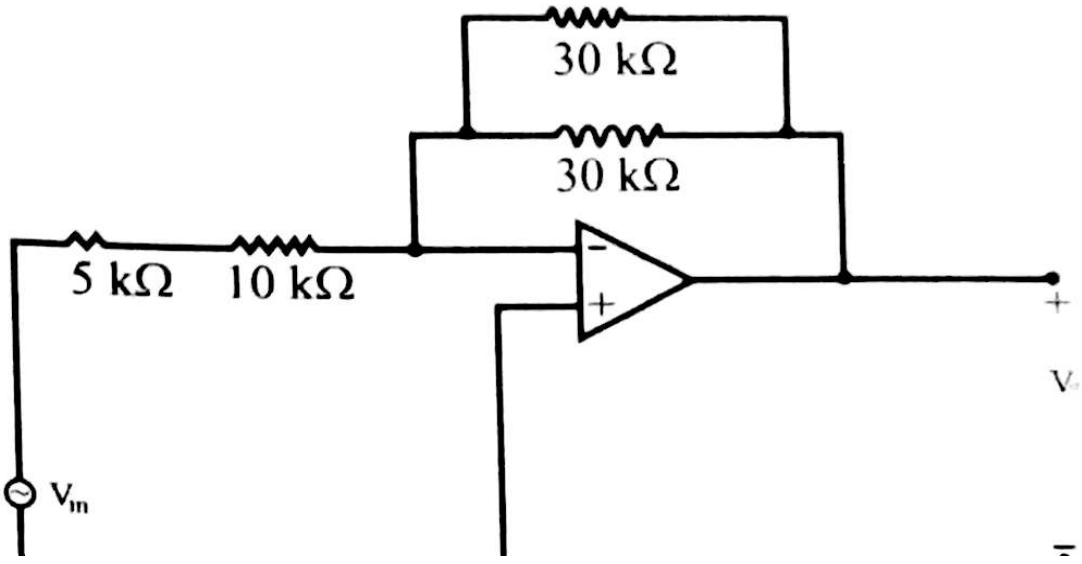
A) 4
C) -20
B) 20
D) -4

Q.19 **What is gain of OP-AMD shown in figure:**



A) 0
C) ∞
B) 10^5
D) 1

Q.20 **What is gain of OP-AMP shown in figure:**



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ANSWER KEY (Worksheet-10)

1	B	11	A
2	B	12	A
3	C	13	D
4	C	14	D
5	C	15	B
6	D	16	A
7	A	17	B
8	B	18	D
9	D	19	D
10	A	20	D

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Worksheet-12

Topic:- Coulomb's Law, Electric Field Strength, Electric Potential & Potential Gradient, Capacitors & Energy Stored in Capacitor

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Q.1 For a capacitor the charge per unit volt is called:

A) Charge density
B) Charge per unit volume
C) Capacitance
D) None of these

Q.2 Farad is unit of:

A) Charge
B) Potential
C) Current
D) Capacitance

Q.3 A capacitor is a perfect insulator for:

A) A.C
B) D.C
C) Both "A" and "B"
D) None of these

Q.4 The value of capacitance does not depends upon:

A) Area of plates
B) Plates separation
C) Dielectric introduced
D) Thickness of plates

Q.5 If the dielectric is inserted between the plate of charged capacitor which is disconnected from the source then:

A) It's capacitance increases
B) It's electric field decreases
C) It's charge remains same
D) All of these

Q.6 A $50\mu F$ capacitor has a potential difference of 8 volts across it, The charge on the capacitor will be:

A) $4\times10^{-4}C$
B) $4\times10^{-3}C$
C) $4\times10^{4}C$
D) $4\times10^{3}C$

Q.7 Three capacitors of capacitance $3\mu F$ each are connected in parallel the equivalent capacitance will be:

A) $9\mu F$
B) $\frac{1}{3}\mu F$
C) $27\mu F$
D) $2\mu F$

Q.8 If $6\mu F$, $4\mu F$ and $2\mu F$ capacitors are connected is series the equivalent capacitance is given by:

A) $\frac{12}{11}\mu F$
B) $\frac{11}{12}\mu F$
C) $6\mu F$
D) $5\mu F$

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Q.9 **The study of charges at rest under the action of electric forces is called:**

A) Electromagnetics
B) Electrostatics
C) Electricity
D) None of these

Q.10 **The existence of an object is primarily because of:**

A) Magnetic force
B) Electric force
C) Gravitational force
D) Nuclear force

Q.11 **Which one is sure test for the presence of charge on a body?**

A) Attraction
B) Repulsion
C) Both A and B
D) None of these

Q.12 **Coulomb's force:**

A) Obeys inverse square law
B) Depends on magnitudes of charges
C) Depends on medium between charges
D) All of these

Q.13 **A charge q is divided into two parts 'q_1 and $(q - q_1)$'. What is the ratio $\frac{q}{q_1}$ so that force between the two parts placed at a given distance is maximum?**

A) 1:1
B) 2:1
C) 1:2
D) 1:4

Q.14 **The zero field spot in case of two unequal and opposite charges exist:**

A) Between the charges at mid-point
B) Between the charges but closer to smaller charge
C) Both A and B
D) None of these

Q.15 **The ratio of electric force to electric field strength gives the units of:**

A) Current
B) Charge
C) Time
D) None of these

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Q.16 **The work done in carrying a unit positive charge from one point to other in electric field keeping the charge in equilibrium is called:**

A) Electric potential energy

B) Electric potential difference

C) Electric field strength

D) None of these

Q.17 **An ECG records _____ between points on human skin.**

A) Current

B) Charge

C) Voltage

D) Electric field

Q.18 **Which statement is true for two oppositely charged metal plates?**

A) Electric field is constant between plates

B) Potential difference is constant between plates

C) Electric potential is zero at mid-point of plates

D) All of these

Q.19 **If a charge of 5 C is moved against an electric field of 10 NC^{-1} through a distance of 5 m, the P.E gained by charge is:**

A) 25J

B) 200J

C) 2J

D) 250J

Q.20 **Two point charges each of magnitude "q" and opposite sign are separated by distance "2d". Which one of following statement is true?**

A) Electric Potential at midpoint of charges is zero

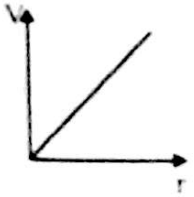
B) Electric field at midpoint of charges is not zero

C) Potential difference at midpoint is not zero

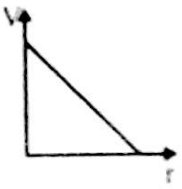
D) All of these

Q.21 **The graph which correctly describes the relation between electric potential "V" at a point due to point charge and distance "r" from point charge is:**

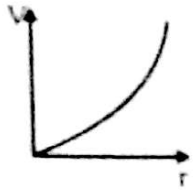
A)



C)



B)



D)

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Q.22 **If the magnitude of a point charge is doubled and distance of a point from point charge is halved, then electric potential and electric field at that point becomes:**

A) Two times each

B) Two times & four times

C) Four times & Eight times

D) None of these

Q.23 **A particle carrying a charge of 10e falls through a potential difference of 5 V, the energy gained by it is:**

A) 50 eV

B) 5 eV

C) 3.2×10^{-18}J

D) Both A and C

Q.24 **If a dielectric slab of dielectric constant ε_r is placed between plates of a charged capacitor, the energy stored:**

A) Decreases

B) Remains same

C) Increases

D) None of these

Q.25 **Which one is not the expression of energy stored in a capacitor?**

A) $\frac{1}{2}CV^2$

B) $\frac{1}{2}\frac{Q^2}{C}$

C) $\frac{1}{2}QV$

D) $\frac{1}{2}E^2\varepsilon_0\varepsilon_r$

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ANSWER KEY (Worksheet-12)

1	C	11	B	21	D
2	D	12	D	22	C
3	B	13	B	23	A
4	D	14	D	24	A
5	D	15	B	25	D
6	A	16	B		
7	A	17	C		
8	A	18	D		
9	B	19	D		
10	B	20	D		

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Worksheet-13

Topic:- Current, Ohm's Law, Combination of Resistors, Resistivity, Potential Difference & e.m.f, Power Dissipation, Kirchhoff's Rules

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Q.1 **The graphical representation of ohm's law is:**

A) Hyperbola
C) Parabola
B) Ellipse
D) Straight Line

Q.2 **Ohm is defined as:**

A) Volt / Ampere
C) Ampere / Volt
B) Volt / Coulomb
D) Joule / Coulomb

Q.3 **The resistance of a meter cube of the substance is called:**

A) Resistivity
C) Permittivity
B) Conductivity
D) None of these

Q.4 **The S.I unit of resistivity is:**

A) ohm-m
C) ohm-m^3
B) ohm-m^2
D) ohm-cm

Q.5 **When the resistances are connected in series the equivalent resistance is equal to?**

A) Sum of the reciprocal of the individual resistances
B) Sum of individual resistances
C) Product of the individual resistances
D) Can't be predicted

Q.6 **The potential difference across resistances in series combination is:**

A) Always same
C) May be same or different
B) Always different
D) None of these

Q.7 **Three resistances 500 ohm, 350 ohm and 500 ohm are connected in series the equivalent resistance will be:**

A) 1300 Ω
C) 650 Ω
B) 1350 Ω
D) 1400 Ω

Q.8 **The resistance of a 60 watt bulb in a 120 volt line is:**

A) 240 Ω
C) 60 Ω
B) 220 Ω
D) 200 Ω

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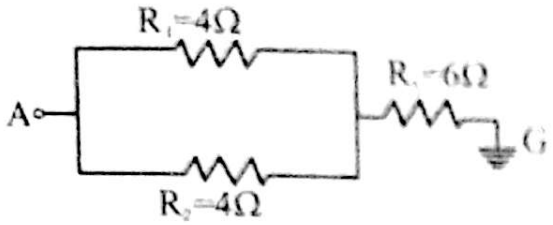
Q.9 **In the circuit shown**



If voltage applied at A is 20 V then what would be the resultant current passing through R_3.

A) 4 A
C) 2.5 A
B) 6 A
D) 10 A

Q.10 **If a battery of 9 V is connected across 2.0 Ω resistance, then what would be the resultant current?**

A) 4.0 A
C) 3.5 A
B) 4.5 A
D) 5.0 A

Q.11 **What is true about electric field and electric force:**

A) Electric field lines are towards negative & electrons flow in same direction

B) Electric field lines are towards positive & electrons flow in opposite direction

C) Electric field lines are towards negative & electrons flow in opposite direction

D) Electric field lines are towards positive & electrons flow in same direction

Q.12 **Internal resistance of the cell is caused due to the:**

A) Static charges
C) Electrolyte
B) Electrodes
D) None of these

Q.13 **A voltmeter directly connected across a battery in a circuit where current is flowing, will measure:**

A) Emf

B) Terminal potential difference

C) Internal resistance

D) None of these

Q.14 **Value of current for ideal short circuit is:**

A) Zero
C) Both are possible
B) Infinity
D) None of these

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Q.15 **Value of current is _____ for open circuit.**

A) Zero
B) Infinity
C) Both A and B
D) None of these

Q.16 **For close circuit (with load applied across battery), the emf E of battery is related with terminal potential difference V_t as:**

A) $E > V_t$
B) $E < V_t$
C) $E = V_t$
D) All of these

Q.17 **Kirchhoff's 1st rule is in accordance with law of conservation of:**

A) Energy
B) Momentum
C) Mass
D) None of these

Q.18 **When the battery is being charged, then emf E and terminal Potential difference V_t are related as:**

A) $E > V_t$
B) $E < V_t$
C) $E = V_t$
D) Any of these

Q.19 **The potential difference between the terminals of a battery in open circuit is 2.2 V. When it is connected across a resistance of 5 Ω, the potential falls to 1.8 V. The current drawn from battery is:**

A) 0.46 A
B) 0.54 A
C) 0.26 A
D) 0.36 A

Q.20 **Referring to Q .19, the internal resistance of battery is:**

A) 3.1 Ω
B) 2.1 Ω
C) 1.1 Ω
D) 0.51 Ω

Q.21 **In the rules for finding the potential changes, if a resistor is traversed in the direction of current, the change in potential is:**

A) Zero
B) Negative
C) Positive
D) Any of these

Q.22 **Kirchhoff's 2nd rule is based on:**

A) Energy conservation
B) Mass conservation
C) Charge conservation
D) Momentum conservation

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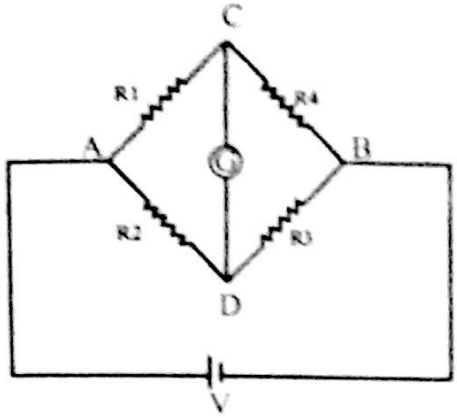
Q.23 **In the bridge shown below:**



The final expression of balanced bridge is:

A) $\frac{R_1}{R_2} = \frac{R_3}{R_4}$

C) $\frac{R_2}{R_4} = \frac{R_1}{R_3}$

B) $\frac{R_1}{R_3} = \frac{R_4}{R_2}$

D) $\frac{R_1}{R_4} = \frac{R_2}{R_3}$

Q.24 **In the bridge circuit shown in Question # 23, if R_1=R, R_2=R, R_3=2R and R_4=2R, then the effective Resistance between A and B is:**

A) $\frac{5R}{2}$

C) $\frac{3R}{2}$

B) $\frac{7R}{2}$

D) $\frac{4R}{3}$

Q.25 **Referring to the values of resistances in Question # 24, the effective resistance between C and D is:**

A) $\frac{5R}{2}$

C) $\frac{3R}{2}$

B) $\frac{7R}{2}$

D) $\frac{4R}{3}$

Q.26 **Referring to the Question # 24, the net current through Galvanometer is:**

A) Zero

C) Half of maximum

B) Maximum

D) Can't be predicted

Q.27 **Wheatstone bridge is based on Kirchhoff _____.**

A) 1st

C) 3rd

B) 2nd

D) 4th

Q.28 **A charge of 90C passes through a wire in 1 hour and 15 minutes. What is the current in the wire?**

A) 1 mA

C) 20 mA

B) 5 mA

D) 10 mA

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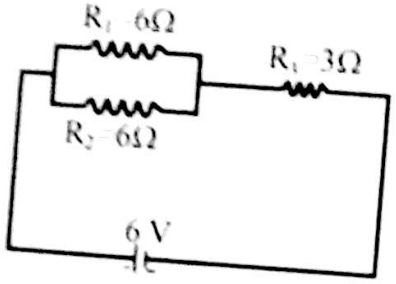
Q.29 **Find the equivalent resistance of the circuit:**



A) 3 Ω
C) 6 Ω
B) 12 Ω
D) 4 Ω

Q.30 **Referring to Q.29, the total current drawn from source is:**

A) 0.5 A
C) 1 A
B) 2 A
D) None of these

Q.31 **Referring to Q.29, the current passing through R_1 is:**

A) 0.5 A
C) 1 A
B) 2 A
D) None of these

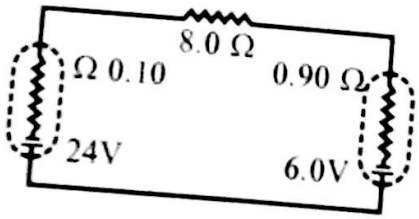
Q.32 **Referring to Q.29, the current passing through R_2 is::**

A) 0.5 A
C) 1 A
B) 2 A
D) None of these

Q.33 **Referring to Q.29, the current passing through R_3 is:**

A) 0.5 A
C) 1 A
B) 2 A
D) None of these

Q.34 **Calculate terminal potential difference of 24 V cell in circuit:**



A) 24.2 V
C) 24 V
B) 23.8 V
D) None of these

Q.35 **Referring to Q.34, Calculate terminal potential difference of 6 V cell in circuit:**

A) 4.2 V
C) 7.8 V
B) 5.5 V
D) None of these

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ANSWER KEY (Worksheet-13)

1	D	11	C	21	B	31	A
2	A	12	C	22	A	32	A
3	A	13	B	23	D	33	C
4	A	14	B	24	C	34	B
5	B	15	A	25	D	35	C
6	C	16	A	26	A		
7	B	17	D	27	B		
8	A	18	B	28	C		
9	C	19	D	29	C		
10	B	20	C	30	C		

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Unit – 9 (WS-13)

Q.1 **Answer is "D"**

Hint:- Fact

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Topic:- Magnetic Field Due to Current Carrying Straight Wire & Solenoid, Force on a Moving Charge in Magnetic Field & e/m of Electron

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Q.1 **The relation $B = \frac{\mu_o I}{2\pi r}$ is called:**

A) Ampere's law
B) Lenz's law
C) Faraday's law
D) Ohm's law

Q.2 **The value of permeability of free space in S.I unit is:**

A) $4\pi \times 10^{7}\ wb\ Am^{-1}$
B) $4\pi \times 10^{-7}\ wbA^{-1}m^{-1}$
C) $4\pi \times 10^{-10}\ wbA^{-1}m^{-1}$
D) $4\pi \times 10^{10}\ wbA^{-1}m^{-1}$

Q.3 **The magnetic field along the axis of solenoid with N turns carrying a current I is given by:**

A) $B = \mu_o nI$
B) $B = \mu_o NI$
C) $B = \frac{\mu_o n}{I}$
D) $B = \frac{I}{\mu_o N}$

Q.4 **In case of solenoid if it is cut into equal parts then "n" becomes:**

A) Half
B) Remains same
C) Double
D) None of these

Q.5 **Generalized form of Ampere's law is given by:**

A) $\sum_{r=1}^{n}\left(\vec{B}.\vec{\Delta l}\right)_r = I$
B) $\sum_{r=1}^{n}\left(\vec{B}.\vec{\Delta l}\right)_r = \mu_o I$
C) $B = \mu_o nI$
D) $B = \mu_o \frac{N}{L} I$

Q.6 **A straight current carrying conductor in which current is going from bottom to top. What will be the direction of magnetic field if viewed from above?**

A) Clock-wise
B) Anti-clock wise
C) Both "A" and "B"
D) Can't be predicted

Q.7 **If we double all the parameters of force acting on current carrying conductor and $\theta = 90°$ then magnetic force becomes:**

A) Remains same
B) Double
C) Eight times
D) Four times

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Q.8 **A current carrying solenoid is squeezed to half of it's length keeping number of turns same and current constant, How would it changes the magnetic field in it?**

A) Remains same
C) Becomes half
B) Becomes double
D) Becomes four times

Q.9 **According to amperes law if current is increased the value of magnetic field will be:**

A) Increased
C) Remain same
B) Decreased
D) None of these

Q.10 **A magnetic field is applied on an electron at rest then it will:**

A) Start moving
C) Remain at rest
B) Start rotating
D) None of these

Q.11 **A charge particle is projected perpendicular into a region of $\vec{B}$ such that before entering it's** K.E = 6ev **, what will be true about it?**

A) It will be in angular dynamic equilibrium

B) It will be continuously accelerated yet it's K.E will remain same

C) It will move along a circular path with no torque

D) All of these

Q.12 **An α-particle is projected in a region of magnetic field as shown in the following figure. What will be the direction of torque in it?**

A) Clock-wise
C) Along axis of rotation
B) Anti-clock wise
D) It has no torque

Q.13 **An electron is injected into a uniform magnetic field with components of velocity parallel to and normal to the field direction. The path of the electron is a:**

A) Helix
C) Parabola
B) Circle
D) Straight line

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Q.14 Particle enters a region where a uniform electric field E and a uniform magnetic field B exist. If E and B are perpendicular to each other and also perpendicular to the velocity v of the particle, then particle will move un-deviated if v=

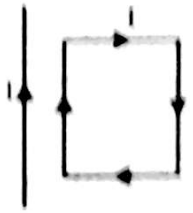
A) $\frac{B}{E}$

B) EB

C) $\frac{E}{B}$

D) $\frac{B^2}{E}$

Q.15 A rectangular loop carrying a current I is situated near a long straight wire such that the wire is parallel to one of the sides of the loop and is in the plane of the loop. If a steady current is established in the wire as shown in the figure, the loop will:



A) Rotate about an axis parallel to the wire

B) Move towards the wire

C) Move away from the wire

D) Remain stationary

Q.16 A beam of β particles is projected in the magnetic field as shown in the figure. The β particles:

A) Will deflect in the upward direction

B) Will deflect in the downward direction

C) Suffer no deflection

D) Will deflect out of paper

Q.17 When a charge is moving with uniform speed it produces?

A) Constant electric field

B) Constant magnetic field

C) Varying electric field

D) Varying magnetic field

Q.18 The geometry of magnetic field lines produced around the current carrying conductor depend upon:

A) Length of conductor

B) Area of conductor

C) Shape of conductor

D) All of these

Q.19 Magnetic field B due to finite length current carrying solenoid at the corners of solenoid is:

A) $B = \mu_0 nI$

B) $B = 2\mu_0 nI$

C) $B = \frac{1}{2}\mu_0 nI$

D) None of these

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Q.20 **If two current carrying wires are placed parallel to each other and direction of current is same in both conductors, then magnetic field at mid-point between the conductors is _____.**

A) Zero

B) Twice than individual conductor

C) Half than individual conductor

D) None of these

Q.21 **If a wire having current 10 A has magnetic field 3 T at a distance d. What will be the magnetic field at double of the distance:**

A) Reduces by factor 2

B) Becomes double

C) Reduces by factor 4

D) Becomes triple

Q.22 **What is true regarding magnetic force & magnetic intensity:**

A) If electron's movement is parallel to magnetic field it will rotate clockwise

B) If electron's movement is parallel to magnetic field it will rotate anti clockwise

C) If electron enters perpendicular to field force would be parallel to plane

D) If electron enters perpendicular to field force will be maximum

Q.23 **If electron passes through axis of solenoid then electromagnetic force on electron will be:**

A) Towards the outward

B) Parallel to its motion

C) Towards the inward

D) No force acts on it

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ANSWER KEY (Worksheet-14)

1	A	11	D	21	A
2	B	12	D	22	D
3	A	13	A	23	D
4	B	14	C		
5	B	15	B		
6	B	16	A		
7	C	17	B		
8	B	18	C		
9	A	19	C		
10	C	20	A		

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Worksheet 15

Topics: [illegible]

Q 1 [illegible]

Q 3 [illegible]

Q 4 The energy of a photon of frequency f is given by $E = hf$, where h is Planck's constant. The momentum of a photon of wavelength λ is $p = \frac{h}{\lambda}$. Then we may conclude that velocity of light is equal to

(A) [illegible]

(B) [illegible]

(C) Ep

(D) [illegible]

Q 5 If the value of h is 6.6×10^{-34} J s, the energy of a photon of frequency 10^{15} Hz will be

(A) [illegible]

(B) [illegible]

(C) [illegible]

(D) [illegible]

Q 6 If stopping potential is 5 volts. The maximum K.E of photoelectron is

(A) [illegible]

(B) [illegible]

(C) [illegible]

(D) [illegible]

Q 7 K.E max of photoelectrons depends upon

(A) [illegible]

(B) [illegible]

(C) [illegible]

(D) [illegible]

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Q.8 **If work function for a surface is $\frac{h}{2}$ then photoelectric threshold frequency is (where h is plank's constant)**

A) 2 Hz
B) 0.5 Hz
C) 1.5 Hz
D) 2 Hz

Q.9 **Which cathode material emits photoelectrons for white light?**

A) Potassium cathode
B) Cesium coated oxidized silver cathode
C) Both A and B
D) Aluminum cathode

Q.10 **A brighter light as compared to a dimmer light of same colour will eject:**

A) More number of electrons
B) Less number of electrons
C) Electrons of greater K.E
D) Electrons of lesser K.E

Q.11 **The rest mass of photon is.**

A) Zero
B) Infinite
C) Finite
D) Constant

Q.12 **Which of the following equation represent Einstein's equation of photoelectric effect K.E $_{max}$=?**

A) hf
B) $h(f-f_o)$
C) hf_o
D) $h(f-f_o)$

Q.13 **On increasing the frequency of incident light in photoelectric effect:**

A) Photoelectric current decrease
B) Photoelectric current increases
C) Stopping potential increases
D) Stopping potential decreases

Q.14 **If a photon of energy 5.2 eV strikes a metal surface of work function 4 eV, then maximum K.E. of photoelectrons is.**

A) 9.2 eV
B) 1.5 eV
C) 4.2 eV
D) 1.2 eV

Q.15 **The slope of the graph between K.E$_{max}$ of photoelectrons and frequency of incident light gives units of:**

A) h
B) $\frac{h}{e}$
C) $\frac{e}{h}$
D) he

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Q.16 **When light of wavelength 100 nm falls on a metal, photoelectrons are ejected. If another light of 200 nm is sufficient for photoemission from another metal, then ratio of work function of two metals is:**

A) 1:2
B) 4:1
C) 2:1
D) 1:4

Q.17 **A source of light is placed at a distance of 10 cm from photocell and stopping potential is V_o if source is now placed at 20 cm then stopping potential will become:**

A) $\frac{V_o}{2}$
B) $2V_o$
C) $\frac{V_o}{4}$
D) V_o

Q.18 **Which one shows wave nature of particles:**

A) Photoelectric effect
B) Compton effect
C) Pair production
D) Davisson and Germer experiment

Q.19 **When a ball is thrown upwards, then its de-Broglie's wavelength will be minimum?**

A) At the point of projection
B) At maximum height
C) At the point midway between the initial and final points
D) Both A and B

Q.20 **If an electron, neutron and a proton have the same de-Broglie wavelength then which particle will have the greatest speed?**

A) Electron
B) Alpha particle
C) Neutron
D) Proton

Q.21 **If K.E of electron is doubled in Davison Germer experiment then its de-Broglie's wavelength is:**

A) Doubled
B) Halved
C) Increased by four times
D) None of these

Q.22 **If a proton and an alpha particle are accelerated by same voltage, then the ratio of wavelengths associated with them is:**

A) 4:1
B) 2:1
C) $2\sqrt{2}$:1
D) 8:1

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ANSWER KEY (Worksheet-15)

1	B	11	A	21	D
2	A	12	D	22	C
3	A	13	C		
4	B	14	D		
5	A	15	A		
6	C	16	C		
7	D	17	D		
8	B	18	D		
9	A	19	A		
10	A	20	A		

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Worksheet-16

Topic:- Hydrogen Spectrum, Bohr's Model of Hydrogen Atom, X-rays & Energy Band Theory

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Q.1 **Transitions of electrons between the various shells can produce:**

A) Continuous X – rays
B) Characteristic X-rays
C) Both X-rays
D) None of these

Q.2 **K-series of characteristic X-rays are produced when all the transitions of inner-shell electrons terminate on:**

A) M-shell
B) N-shell
C) K-shell
D) None of these

Q.3 **The reverse process of photo-electric effect is called:**

A) Pair production
B) Compton effect
C) X-rays production
D) None of these

Q.4 **X-rays were discovered by:**

A) Compton
B) Roentgen
C) De-Broglie
D) Maxwell

Q.5 **X-rays can exhibit the phenomenon of:**

A) Interference
B) Diffraction
C) Polarization
D) All of these

Q.6 **The rest mass of X-rays photon is:**

A) Infinite
B) Zero
C) 9.1×10^{-31} kg
D) 1.67×10^{-27} kg

Q.7 **X-rays are:**

A) Electromagnetic waves
B) Longitudinal waves
C) Mechanical waves
D) Matter waves

Q.8 **The velocity of X-rays is equal to:**

A) α – rays
B) γ – rays
C) β – rays
D) Sound waves

Q.9 **X-rays can be used to:**

A) Treat cancer
B) Detect bone fractures
C) Detect flaws in welding
D) All of above

Q.10 **X-rays are deflected by:**

A) Electric field only
B) Magnetic field only
C) Electric and magnetic field both
D) Can't be deflected

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Q.11 X-Rays are produced in an evacuated glass tube called:

A) Wilson cloud tube
B) G.M tube
C) Collidal tube
D) Coolidge tube

Q.12 Continuous X-Rays are produced by:

A) Accelerating electrons
B) Decelerating electrons
C) Both "A" and "B"
D) Inner shell transitions

Q.13 X-Rays can pass easily through:

A) Aluminium
B) Wood
C) Human flesh
D) All of these

Q.14 Which of the following characteristic X-Ray is most energetic:

A) K_α
B) K_β
C) L_α
D) L_β

Q.15 Generally softer X-Rays are used in:

A) CAT scanning
B) Forensic applications
C) Industry
D) Both "A" and "B"

Q.16 Wavelength of characteristics X-ray depend upon:

A) Filament current
B) Accelerating potential
C) Nature of metal
D) Both "B" and "C"

Q.17 Minimum wavelength of X-Rays depend upon:

A) Target material
B) Accelerating Voltage
C) Filament current
D) Intensity of incident electrons

Q.18 In Coolidge tube target material used may be:

A) Aluminium
B) Molybedinium
C) Tungsten
D) Both "B" and "C"

Q.19 Hydrogen atom is not capable of emitting X-rays because:

A) Its size is small
B) It contains infinite energy states
C) It's energy levels are very close to each other
D) It exists in molecular form

Q.20 X-Ray region lies between:

A) γ-rays and radio waves
B) Cosmic rays and γ-rays
C) γ-rays and ultraviolet
D) Visible and Infrared

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Q.21 **If electron of 60 keV strike a heavy target. Then radiation emitted by target will be:**

A) Visible light
B) Radio waves
C) Ultraviolet
D) X-rays

Q.22 **When X-rays photograph of patient is taken, then majority of X – Rays are absorbed in?**

A) Flesh
B) Muscles
C) Bones
D) All of these

Q.23 **X-rays are not used in RADAR, because:**

A) X-rays are not reflected by target
B) X-rays are completely absorbed by air
C) X-rays damage the target
D) All of the above

Q.24 **X-ray photons are absorbed in tissues, they break molecular bonds and create highly reactive free radicals which in turn can disturb the molecular structure of the proteins and especially:**

A) The genetic material
B) Flesh
C) Bones
D) Teeth

Q.25 **For the production of X-rays cathode should have the following properties:**

A) Low value of work function
B) High value of work function
C) A low heat capacity
D) Both "A" and "C"

Q.26 **Computed Tomography is specially used to check the tumor in:**

A) Brain
B) Abdomen
C) Liver
D) None of these

Q.27 **In CAT scanner the beam of X-rays used is of:**

A) Spherical shaped
B) Fan shaped
C) Rectangular shape
D) All of these

Q.28 **Which of the following X-rays depend upon target material for their speed?**

A) Characteristic X-rays
B) Continuous X-rays
C) Both "A" and "B"
D) None of these

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Q.29 **The hardest photon coming out of X ray tube must belong to:**

A) Characteristic X rays C) Both "A" and "B"

B) Continuous X rays D) [illegible]

Q.30 **The hardness is:**

A) Directly proportional to "f"

B) Inversely proportional to "f"

C) Both "A" and "B"

D) Directly proportional to "λ"

Q.31 _____ **deals with the study of wavelength and intensity of electromagnetic radiation spectrum emitted or absorbed by atoms:**

A) Relativity C) Radioactivity

B) Spectroscopy D) Photoelectric effect

Q.32 **Velocity of electron in the first orbit is:**

A) 2.19×10^{6} ms^{-1} C) 2.19×10^{7} ms^{-1}

B) 2.18×10^{7} ms^{-1} D) 2.3×10^{6} ms^{-1}

Q.33 **If a mono-atomic gas is ionized then it shows:**

A) Line spectrum C) Band spectrum

B) Continuous spectrum D) Visible spectrum

Q.34 **Velocity of electron in an orbit is _____ to/of principal quantum number:**

A) Directly proportional C) Inversely proportional

B) Not related D) proportional to square

Q.35 **Normally electrons in the hydrogen atom are in the:**

A) Ground state C) Excited state

B) Ionized state D) Meta stable state

Q.36 **Free electron may have energy:**

A) Quantized C) Integral of E_0

B) Half of E_0 D) Any amount

Q.37 **Shortest wavelength of Lyman series is:**

A) 91 nm C) 100 nm

B) 9.1 nm D) 10 nm

Q.38 **Radiation with wavelengths longer than red light is:**

A) Ultra violet C) Visible

B) X-rays D) Infrared

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Q.39 **The excitation energy of an electron to send it to $n = \infty$, is equal to:**

A) Potential energy
B) Total energy
C) Kinetic energy
D) Ionization energy

Q.40 **The ratio of kinetic energy and the total energy of the electron in the hydrogen atom is.**

A) 1:1
B) 1: -1
C) 1:2
D) 1: -2

Q.41 **Which of these series of hydrogen spectrum lies in the ultra-violet region?**

A) Paschen series
B) Brackett series
C) Pfund series
D) Lyman series

Q.42 **The ratio of longest and shortest wavelengths of Lyman series is:**

A) $\frac{4}{3}$
B) $\frac{9}{4}$
C) $\frac{9}{5}$
D) $\frac{16}{5}$

Q.43 **With increasing quantum number, the energy difference between adjacent levels in atoms:**

A) Increases
B) Decreases
C) Remains constant
D) Increases only for high Z

Q.44 **If L is angular momentum of electron in the 2nd orbit of hydrogen atom then angular momentum in the fourth orbit will be.**

A) 2L
B) $\frac{L}{2}$
C) $\frac{3}{L}$
D) $\frac{L}{3}$

Q.45 **Photon of smallest wavelength will be absorbed when transition takes place from _____ to _____orbit.**

A) 2, 6
B) 1, 6
C) 3, 6
D) 4, 6

Q.46 **In an electronic transition, atom cannot emit.**

A) UV rays
B) Visible light
C) γ-rays
D) Infrared rays

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Q.47 When an electron in hydrogen atom jumps from second orbit to first orbit then energy of photon emitted is:

A) 13.6 eV
C) 10.2 eV
B) 3.4 eV
D) 10.2 V

Q.48 The longest wavelength of radiation for the paschen series is:

A) 1094 nm
C) 234 nm
B) 1875 nm
D) 91 nm

Q.49 The value of principal quantum to find maximum value of wavelength in Pfund series is:

A) 3
C) 5
B) 4
D) 6

Q.50 For the hydrogen atom, the ratio $\frac{\Delta r_{23}}{\Delta r_{34}} =$ ——, where $\Delta r_{23} = distance$ between 2nd and 3rd shell and $\Delta r_{34} = distance$ between 3rd and 4th shell.

A) $\frac{3}{4}$
C) $\frac{3}{7}$
B) $\frac{5}{4}$
D) $\frac{5}{7}$

Q.51 Which Postulate of Bohr's Model of the hydrogen atom contradict with classical physics?

A) 1st
C) 3rd
B) 2nd
D) All of these

Q.52 The ratio of K.E to P.E for an electron in 5th shell of hydrogen atom is:

A) 2:1
C) 5:25
B) 1:2
D) 3:4

Q.53 Which one is the example of continuous spectrum?

A) Atomic spectrum
B) Molecular spectrum
C) Black body radiation spectrum
D) None of these

Q.54 The excitation energy of electron is _____ than/to the ionization energy in Hydrogen atom?

A) Greater
C) Equal
B) Less
D) Any of these

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Q.55 **The Rydberg constant has the dimensions:**

A) Reciprocal of length
B) Reciprocal of wavelength
C) Reciprocal of time
D) Both A & B

Q.56 **The electrical properties of solids are successfully explained by _____ which is based on _____.**

A) Conventional free electron theory, Bohr model
B) Classical theory, Rutherford model
C) Energy band theory, Rutherford model
D) Energy band theory, wave mechanical model

Q.57 **The electrical conductivities of semiconductors ranges from:**

A) 10^{7} to 10^{9} $(\Omega m)^{-1}$
B) 10^{-20} to 10^{-10} $(\Omega m)^{-1}$
C) 10^{-6} to 10^{-2} $(\Omega m)^{-1}$
D) 10^{-6} to 10^{-4} $(\Omega m)^{-1}$

Q.58 **Which one is not similarity between conductors and semiconductors?**

A) Both have partially fill conduction band
B) Both have partially fill valence band
C) Both can conduct current
D) Both become insulator at zero kelvin

Q.59 **The majority charge carriers in n-type substance are:**

A) Electrons
B) Holes
C) Positive charges
D) All of these

Q.60 **The minority charge carriers in p-type substance are:**

A) Electrons
B) Holes
C) Positive charges
D) All of these

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ANSWER KEY (Worksheet-16)

1	B	16	C	31	B	46	C
2	C	17	B	32	A	47	C
3	C	18	D	33	A	48	B
4	B	19	C	34	C	49	D
5	D	20	C	35	A	50	D
6	B	21	D	36	D	51	A
7	A	22	C	37	A	52	B
8	B	23	A	38	D	53	C
9	D	24	A	39	D	54	B
10	D	25	D	40	B	55	D
11	D	26	A	41	D	56	D
12	B	27	B	42	A	57	D
13	C	28	D	43	B	58	D
14	B	29	B	44	A	59	A
15	D	30	C	45	B	60	A

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Worksheet-17

Topic:- Atomic Nucleus, Radio Activity, Nuclear Transmutation, Mass-Defect & Binding Energy

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Q.1 Isotopes have same:

A) Chemical properties
B) Physical properties
C) Both of these
D) None of these

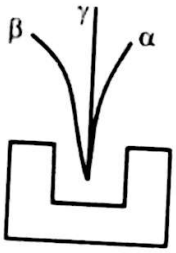
Q.2 Which of following element has maximum number of isotopes?

A) Xenon
B) Caesium
C) Nitrogen
D) Both A & B

Q.3 The neutron to proton ratio for $^{16}_{8}O$ is:

A) 2:1
B) 1:2
C) 1:1
D) 8:16

Q.4 In a radioactive phenomenon observation shown in figure where α deviates lesser than β in some electric or magnetic field (not shown in the figure). What is the reason of less deviation of α?



A) α is charged particle
B) α is heavier particle
C) α is neutral particle
D) α is lighter particle

Q.5 What is the charge number of an α-particle emitted during the phenomena of radioactivity?

A) –e
B) +2e
C) –2e
D) +2

Q.6 Which one is a container for storing radioactive substance?

A) Lead
B) Iron
C) Cadmium
D) Copper

Q.7 Which of the following is true for γ-rays?

	Charge	Rest mass
A)	Positive	$m_o c^2$
B)	Negative	Zero
C)	Neutral	$m_o c^2$
D)	Neutral	Zero

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Q.8 **γ-radiation are emitted due to:**

A) De-excitation of atom
C) De-excitation of nucleus
B) Excitation of atom
D) Excitation of nucleus

Q.9 **The phenomenon of radioactivity is associated with:**

A) Decay of nucleus
B) Fusion of nuclei
C) Transmission of radio waves
D) Nuclear reactions caused by cosmic rays

Q.10 **After α-emission from $^{226}_{88}Ra$, the daughter nucleus will be:**

A) $^{226}_{86}Ra$
C) $^{226}_{86}Rn$
B) $^{224}_{86}Ra$
D) $^{222}_{86}Rn$

Q.11 **After β-emission from neutron, which particle is found?**

A) Proton
C) Neutron
B) Electron
D) Proton and electron

Q.12 **An α-emission is always accompanied by:**

A) β-emission
C) Both "A" and "B"
B) γ-emission
D) Neutron emission

Q.13 **The equation $_{Z}X^{A} \longrightarrow {}_{z+1}Y^{A} + {}_{-1}e^{0} + \bar{\upsilon}$ represents:**

A) β-decay
C) γ-decay
B) α–decay
D) Proton decay

Q.14 **In an α-decay:**

A) The parent and daughter nuclei have same number of protons
B) The daughter nucleus has one proton more than parent nucleus
C) The daughter nucleus has two protons less than parent nucleus
D) The daughter nucleus has two neutrons more than parent nucleus

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Q.15 When a radioactive nucleus emits an α-particle, the N/Z ratio?

A) Increases
B) Decreases
C) Remains same
D) Any of these

Q.16 When a radioactive nucleus emits a β-particle, the mass number of the atom?

A) Increases by one
B) Decreases by one
C) Remains the same
D) Decreases by four

Q.17 The decay constant λ of a radioactive sample:

A) Decreases as the age of atoms increases
B) Increases as the age of atoms increases
C) Is independent of the age
D) Depends on the nature of activity

Q.18 Half life of a radioactive substance depends upon:

A) Temperature
B) Pressure
C) Nature of substance
D) Electric & magnetic field

Q.19 The half life of radium is about 1600 years. If 100g radium existing now, 25g will remain un-decayed after:

A) 4800 years
B) 6400 years
C) 6400 years
D) 3200 years

Q.20 Half life of radium is 1600 years. In how many years shall the earth lose all its radium due to radioactive decay?

A) 1590×10^{6} years
B) 1590×10^{12} years
C) 1590×10^{24} years
D) Never

Q.21 The half life of a certain element is 7 days at S.T.P .If the temperature is doubled and pressure is reduced to half then half life of the same element will be:

A) 1.75 days
B) 7 days
C) 3.5 days
D) 14 days

Q.22 Which of the following rays are more energetic?

A) $\alpha - rays$
B) $\gamma - rays$
C) $\beta - rays$
D) All of these

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Q.23 Due to emission of β^+-rays:

A) Mass of the Nucleus Increases

B) Mass of the Nucleus Decreases

C) Charge on the Nucleus Increases

D) Charge on the Nucleus Decreases

Q.24 The Uranium Nucleus $^{238}_{92}U$ undergoes successive decays, emitting respectively $\alpha-particle$, β $particle$ and $\gamma-ray$. What is the atomic number and atomic mass of the resulting nucleus?

A) 90 ,238 C) 91, 234

B) 92,236 D) 92,238

Q.25 A nucleus $^{210}_{81}X$ decays to another nucleus $^{A}_{82}Y$ in four successive radioactive decays. Each decay involves, the emission of either an $\alpha-decay$ or $\beta-decay$. What is the value of A?

A) 210 C) 208

B) 206 D) 204

Q.26 A Radioactive Isotope $^{238}_{92}U$ decays to $^{234}_{92}U$ the particles emitted are:

A) One α and one β C) Two α and one β

B) One α and two β D) Two α and two β

Q.27 Which one of the following radiation possesses maximum penetrating power?

A) α-rays

B) γ-rays

C) β-rays

D) All have equal penetrating power

Q.28 After α-decay, the parent and daughter nuclei are called:

A) Isomers C) Isobars

B) Isotones D) Isodiapheres

Q.29 The emission of β-particle results in:

A) Isomers C) Isobars

B) Isotones D) Isodiapheres

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Q.30 Which one is not true about radioactivity?

A) Radioactivity is a stochastic process

B) Half-life only depends on nature of element

C) Decay rate decreases exponentially with time

D) None of these

Q.31 The number of atoms decayed in four half-lives are:

A) $\frac{N_o}{16}$

B) $\frac{7N_o}{8}$

C) $\frac{N_o}{8}$

D) $\frac{15N_o}{16}$

Q.32 If the half-life of an element is 10 second, the mean life will be:

A) 14.4 sec

B) 10 sec

C) 9.93 sec

D) Can't be predicted

Q.33 The mass defect per nucleon _____ as the atomic number increases till iron, for iron the mass defect per nucleon _____ and after iron the mass defect per nucleon _____ as atomic number increases further.

A) Decreases, minimum, increases

B) Decreases, maximum, decreases

C) Increases, maximum, decreases

D) None of these

Q.34 Among the following which nucleus has maximum mass defect and binding energy:

A) Fe

B) Kr

C) He

D) U

Q.35 Mass defect of 10u is equal to:

A) 1.66×10^{-27} kg

B) 1.66×10^{-26} kg

C) 166×10^{-28} kg

D) Both B and C

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ANSWER KEY (Worksheet-17)

1	A	11	A	21	B	31	D
2	D	12	B	22	A	32	A
3	C	13	A	23	D	33	C
4	B	14	C	24	C	34	D
5	D	15	A	25	B	35	D
6	A	16	C	26	B		
7	D	17	C	27	B		
8	C	18	C	28	D		
9	A	19	D	29	C		
10	D	20	D	30	D		

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Topic:- Nuclear Fission & Fusion Reactions, Elementary Particles

Q.1 **Proton belongs to:**

A) Leptons
B) Baryons
C) Mesons
D) Neutrinos

Q.2 **Which of following belong to leptons?**

A) Electrons
B) Protons
C) Neutrinos
D) Both A & C

Q.3 **Which of following has mass smaller than proton:**

A) Baryon
B) Meson
C) Neutron
D) None of these

Q.4 **Which of following is not an elementary particle?**

A) Photons
B) Hadrons
C) Leptons
D) Muons

Q.5 **A proton is assumed to be made up of _____ quarks.**

A) 2u+1d
B) 2d+1u
C) 2u+2d
D) 3u+1d

Q.6 **In any nuclear reaction, the energy is released if the binding of reactants is _____ than binding energy of products:**

A) Less
B) Greater
C) Equal
D) Any of these

Q.7 **If an α-particle moving with energy 1 MeV strikes with Nitrogen atom $^{14}_{7}N$, the product formed is $^{14}_{7}N + ^{4}_{2}He \rightarrow$ _____?**

A) $^{16}_{8}\mathrm{O} + ^{1}_{1}\mathrm{H} + ^{1}_{0}\mathrm{H}$
B) $^{17}_{8}\mathrm{O} + ^{1}_{1}\mathrm{H}$
C) $^{17}_{8}\mathrm{O} + ^{1}_{0}\mathrm{n} + ^{0}_{+1}\mathrm{e}$
D) Reaction can't happen

Q.8 **The missing particle in following nuclear reaction is:**

$^{9}_{4}Be + ^{4}_{2}He \rightarrow ^{12}_{6}C +$ _____

A) $^{1}_{1}H + ^{0}_{-1}e$
B) $^{1}_{1}H + ^{0}_{+1}e$
C) $^{1}_{0}n$
D) None of these

Q.9 **During the nuclear fission of $^{235}_{92}U$ into $^{132}_{50}Sn$ and $^{101}_{42}Mo$, the number of neutrons emitted are:**

A) 2
B) 3
C) 4
D) 1

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Worksheet-18

Topic:- Nuclear Fission & Fusion Reactions, Elementary Particles

Q.1 **Proton belongs to:**

A) Leptons
C) Mesons
B) Baryons
D) Neutrinos

Q.2 **Which of following belong to leptons?**

A) Electrons
C) Neutrinos
B) Protons
D) Both A & C

Q.3 **Which of following has mass smaller than proton:**

A) Baryon
C) Neutron
B) Meson
D) None of these

Q.4 **Which of following is not an elementary particle?**

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C) Leptons
B) Hadrons
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B) Greater
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A) $^{16}_{8}\mathrm{O} + ^{1}_{1}\mathrm{H} + ^{1}_{0}\mathrm{H}$
C) $^{17}_{8}\mathrm{O} + ^{1}_{0}\mathrm{n} + ^{0}_{+1}\mathrm{e}$
B) $^{17}_{8}\mathrm{O} + ^{1}_{1}\mathrm{H}$
D) Reaction can't happen

Q.8 **The missing particle in following nuclear reaction is:**

$^{9}_{4}Be + ^{4}_{2}He \rightarrow ^{12}_{6}C +$ _____

A) $^{1}_{1}H + ^{0}_{-1}e$
C) $^{1}_{0}n$
B) $^{1}_{1}H + ^{0}_{+1}e$
D) None of these

Q.9 **During the nuclear fission of $^{235}_{92}U$ into $^{132}_{50}Sn$ and $^{101}_{42}Mo$, the number of neutrons emitted are:**

A) 2
C) 4
B) 3
D) 1

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Q.10 **The mass of uranium used in atomic bomb is _____ than/to critical mass?**

A) Less
B) More
C) Equal
D) Much smaller

Q.11 **In a nuclear reactor, the quantity of ^{235}U is increased from:**

A) 0.7 to 1%
B) 2 to 4%
C) 5 to 10%
D) None of these

Q.12 **Which of following is used as a moderator?**

A) Water
B) Heavy water
C) Hydrocarbon
D) All of these

Q.13 **The temperature of steam coming out of turbine is:**

A) 200° C
B) 300° C
C) 500° C
D) 700° C

Q.14 **Fast reactors are designed to make use of _____.**

A) ^{235}U
B) ^{239}U
C) ^{238}U
D) ^{233}U

Q.15 **When two deuterons are fused to form a Helium atom, the energy given out is:**

A) 17 MeV
B) 24 MeV
C) 6 MeV
D) 4 MeV

Q.16 **The nuclear waste is dumped into:**

A) Old salt mine
B) Oceans
C) Populated areas
D) None of these

Q.17 **In a nuclear reactor the mass of uranium used is _____ than/ to critical mass:**

A) Greater
B) Less
C) Equal
D) None of these

Q.18 **In Karachi nuclear power plant _____ is used as moderator.**

A) Water
B) Heavy water
C) Hydrocarbons
D) None of these

Q.19 **The missing reactant in the reaction is:**

$^{3}_{2}He + ____ \rightarrow {}^{4}_{2}He + 2{}^{1}_{1}H + energy$

A) $^{2}_{1}H$
B) $^{3}_{2}He$
C) $^{3}_{1}H$
D) $2{}^{1}_{1}H$

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Q.20 The temperature of core of sun is:

A) 10 million degree Celsius

B) 6000 degree Celsius

C) 20 million degree Celsius

D) None of these

Q.21 The number of protons taking part in P-P reaction:

A) 4

B) 6

C) 5

D) 2

Q.22 The number of protons used in one complete P-P reaction:

A) 4

B) 6

C) 5

D) 2

Q.23 In the P-P reaction, the energy given out per nucleon is:

A) 25.7 MeV

B) 17.6 MeV

C) 4.0 MeV

D) 6.4 MeV

Q.24 In the following reaction, the energy given out is:

$$_{1}^{2}H + _{1}^{3}H \rightarrow _{2}^{4}He + _{0}^{1}n + \text{____}$$

A) 17.6 MeV

B) 3.3 MeV

C) 24 MeV

D) 4.0 MeV

Q.25 The sun is primarily composed of:

A) Hydrogen

B) Oxygen

C) Helium

D) Neon

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ANSWER KEY (Worksheet-18)

1	B	11	B	21	B
2	D	12	D	22	A
3	B	13	B	23	D
4	B	14	C	24	A
5	A	15	B	25	A
6	A	16	A		
7	D	17	C		
8	C	18	B		
9	B	19	B		
10	B	20	C		

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